National Aeronautics and
Space Administration

Lyndon B. Johnson Space Center
Houston, Texas 77058

# HRF Rack One
# Integration Test Procedure III:
# Payload Rack Operation
# Support Procedures

| PROJECT DOCUMENT APPROVAL SHEET | | |
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# HRF Rack One
# Integration Test Procedure III:
# Payload Rack Operation
# Support Procedures

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| DATE | PREPARED BY | CHANGE APPROVALS | CHANGE NUMBER |
|---|---|---|---|
| | | | |

# HRF Rack One
# Integration Test Procedure III:
# Payload Rack Operation
# Support Procedures

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JSC FORM 276 (REV APR 81)

ABSTRACT

This document outlines the empty payload rack verification test interface connections between the Human Research Facility Rack with the Payload Rack Checkout Unit (PRCU) individual payload functionals.  These procedures facilitate the activities required for the mating and demating of the Human Research Facility (HRF) Rack to the PRCU, execution of offline payload functionals, and the preliminary verification tests for the empty HRF Rack.

The purpose of this procedure is to provide the primary steps necessary for successful integration of the payload rack with the test environment.  The payload rack procedure will be conducted in the Building 241 PRCU test environment located at the Johnson Space Center, Houston, Texas.  A step-by-step sequence of activities to be conducted is included in Section 6.0 of this document.

A Test Readiness Review (TRR) will be held prior to the start of this activity.  The TRR Board, Quality Engineering, and the Payload Test Conductor will agree to proceed with the individual tests listed in this document.

KEY WORDS

Human Research Facility
International Space Station Program

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# LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ac | Alternating Current |
| AUX | Auxiliary |
| | |
| BOB | Breakout Box |
| | |
| C&DH | Command & Data Handling |
| CBL | Commercial Bills of Lading |
| COM | Communications |
| COTS | Commercial-Off-The-Shelf |
| CS | Connector Saver |
| | |
| DAPC | Data Acquisition and Process Controller |
| DC | Direct Current |
| DR | Discrepancy Report |
| DVM | Digital Volt Meter |
| | |
| EXPRESS | EXpedite the PRocessing of Experiments to Space Station |
| | |
| FDS | Flight Data System |
| FOD | Foreign Object Damage |
| | |
| GSC | Ground Station Control |
| GSE | Ground Support Equipment |
| GASMAP | Gas Analyzer System for Metabolic Analysis of Physiology |
| | |
| HRDL | High Rate Data Link |
| HRF | Human Research Facility |
| | |
| I&ES | Instrument and Experiment Simulator |
| IPC | Interprocess Communciations |
| IPV | Ion Pump Voltage |
| IS | Information Systems |
| ISPR | International Standard Payload Rack |
| ITCS | Internal Thermal Control System |
| | |
| JSC | Johnson Space Center |
| | |
| LAN | Local Area Network |
| LCD | Liquid Crystal Display |
| LED | Light Emitting Diode |
| LOV | |

LIST OF ACRONYMS AND ABBREVIATIONS (CONT'D)

| | |
|---|---|
| MRDL | Medium Rate Data Link |
| MS-DOS | Microsoft Disk Operating System |
| | |
| NASA | National Aeronautics and Space Administration |
| | |
| PASS | Primary Avionics Software System |
| PCMCIA | Portable Computer Memory Card International Adapter |
| PEPSE | Programmable Electrical Power System Emulator |
| PRCU | Payload Rack Check-out Unit |
| | |
| QA | Quality Assurance |
| | |
| RAMS | Random Access Mass Spectrometer |
| RIC | Rack Interface Controller |
| RS | |
| | |
| SAB | Signal Adapter Box |
| SIR | Standard Interface Rack |
| SOL | |
| SSPCM | Solid State Power Control Module |
| | |
| TCP/IP | Transmission Control Protocol/Internet Protocol |
| TCS | Thermal Control System |
| TPS | Task Performance Sheet |
| TRR | Test Readiness Review |
| TSS | Test Support System |
| | |
| UIP | Utility Interface Panel |
| | |
| V | Volts |
| VES | Vacuum Exhaust System |
| VRDS | Verification Requirements Data Sheet |
| VRS | Vacuum Resource System |
| VMM | Volume Measurement Module |
| VTR | Video Tape Recorder |
| | |
| WS | Workstation |

## 1.0 INTRODUCTION

### 1.1 PURPOSE

This document provides the procedures necessary to integrate a payload rack into the PRCU test environment, perform offline payload functional checks and execute an interface check between the two systems. The expected end product of this activity is to accomplish the offline payload functionals, successful connection, disconnection, and verification of the empty payload rack. This document does not address any HRF Rack to PRCU instructions other than the initial connection, interface check and final disconnect.

### 1.2 SCOPE

This document provides task sequencing to satisfy the test requirements as detailed in the document "Rack One HRF Unique Payload Verification Plan" in SSP-57400, "Human Research Facility Unique Payload Verification Plan for Rack 1, International Space Program". The details listed herein describe the necessary hardware (H/W), configuration, test equipment set-ups, instrumentation requirements, data requirements, safety concerns, and all other details necessary to perform the payload integration.

This procedure is applicable to the subsystems and components of the HRF Rack and the PRCU test environment. The initial interface check of the test environment, payload rack, offline payload functionals, and the demating from the PRCU are described herein.

A notation of To Be Determined, (TBD) has been included throughout this document to signify subsystems that are to be incorporated into the PRCU test environment and/or HRF Rack, but are not functional at this time. Upon completion of the subsystems, the hardware will undergo acceptance testing. Subsystem procedure updates will be included in subsequent document revisions.

### 1.3 DOCUMENT OVERVIEW

This document details the test setup, tear down, and procedures divided into five (5) sections:

Section 6.1    MATING OF PAYLOAD RACK TO INTERNATIONAL
               STANDARD PAYLOAD (ISPR) PANEL
Section 6.2    EMPTY RACK TESTS
Section 6.3    OFFLINE PAYLOAD FUNCTIONALS
Section 6.4    DEMATING OF PAYLOAD RACK FROM ISPR PANEL
Section 6.5    LAN INTERFACES

### 1.3.1 Document Hand-Write Change Control

This document is designed to present baseline procedures for pre-integration testing of the payload and HRF Rack. It is therefore assumed that this document is subject to hand-write changes while in use in the test area. Hand-write entries will be controlled and documented in this procedure. All hand-writes must be approved by Quality Engineering and the Test Conductor prior to implementation. Quality Assurance will validate all hand-writes. If safety is affected, then Safety Personnel must also approve changes. The personnel that have Task Performance Sheet (TPS) signature authority are authorized to make hand-write changes to this document. Hand-written changes to this document will be done using deviation sheets (See Appendix A). This document will be revised to include permanent hand written changes.

### 1.3.2 Warnings and Cautions

Prior to performing any operation, test personnel must be familiar with all "General Notes, Warnings, Cautions, Special Instructions and Safety Precautions" contained in the reference documents and drawings unless otherwise specified within this procedure.

### 1.3.3 Task Sequencing

The procedures outlined in this document are written to assure technical completion of a specified task and are not necessarily sequenced to provide optimum crew/tool equipment utilization or rack build up. The work is to be accomplished sequentially, unless it is more efficient to parallel the operations or the secondary document procedures. The responsible Test Conductor must first evaluate any change to assure that there is no degradation of technical requirements, system safety, personnel safety, scheduling, etc. Sequencing changes require concurrence from Quality Assurance.

### 1.3.4 Repeat Operations

Prior to proceeding, operations that must be repeated require approval of the Test Conductor, and Quality Assurance. All repetitive operations must be documented in the Repetitive Operations Log in Appendix A.

### 1.3.5 Discrepancies

If any discrepancy occurs in the form of an equipment failure, hazard, or emergency, the personnel concerned will take appropriate action to ensure personnel and equipment safety, and report to a Quality Assurance Specialist. The Test Conductor will notify the National Aeronautics and

Space Administration (NASA) facility manager and act as focal point for any further effort required.  If required, a Discrepancy Report (DR), Johnson Space Center (JSC) form 2176 will be initiated by Quality Assurance, and will be tracked and worked as described in document NT1-ADM-013 (See Appendix A).

1.3.6      <u>Safety Support</u>

JSC Safety, Health Requirements established in document JPG 1700.1 Version H, will be strictly adhered to throughout all phases of test activities. All hazardous activities will be coordinated with the appropriate facility personnel.

1.3.7      <u>Emergency/Accident Procedure</u>

The following procedures are to be used in the event of an emergency situation, (i.e. smoke or fire) or in the case of an accident involving personal injury.

Emergency procedures provide pre-planned and approved guidelines for handling potential hardware/software malfunctions and hazardous situations.  If a hazardous situation occurs, the following definitions state the actions necessary to maintain control of the situation and personnel safety. Actions required for the situations not covered by these procedures shall be provided by the Test Conductor real-time, based on his/her best judgment.

<u>Definitions</u>

<u>Abort Test</u>: Take immediate and rapid actions for restoration of safe conditions removal or rescue of test personnel, notification of the appropriate personnel about the hazardous situation, and shutdown of all systems.  This action is taken in catastrophic critical hazard conditions such as fire, smoke, or serious personnel injuries.

<u>Terminate Test</u>: Discontinue test per the standard shutdown procedures provided.  This action is required when the situation prevents further compliance with the test objectives.

<u>Hold and Evaluate</u>: Maintain current test conditions or proceed to safe mode to allow time to review system status and impacts of the situation.  This action is required in the event of a hardware/software malfunction.

Emergency Exits and Equipment

Figure 1-1 shows the emergency exits for personnel in the test area; and shows the location of fire pull-stations and fire extinguishers.  Figure 1-2 shows the emergency meeting place outside of Building 241.
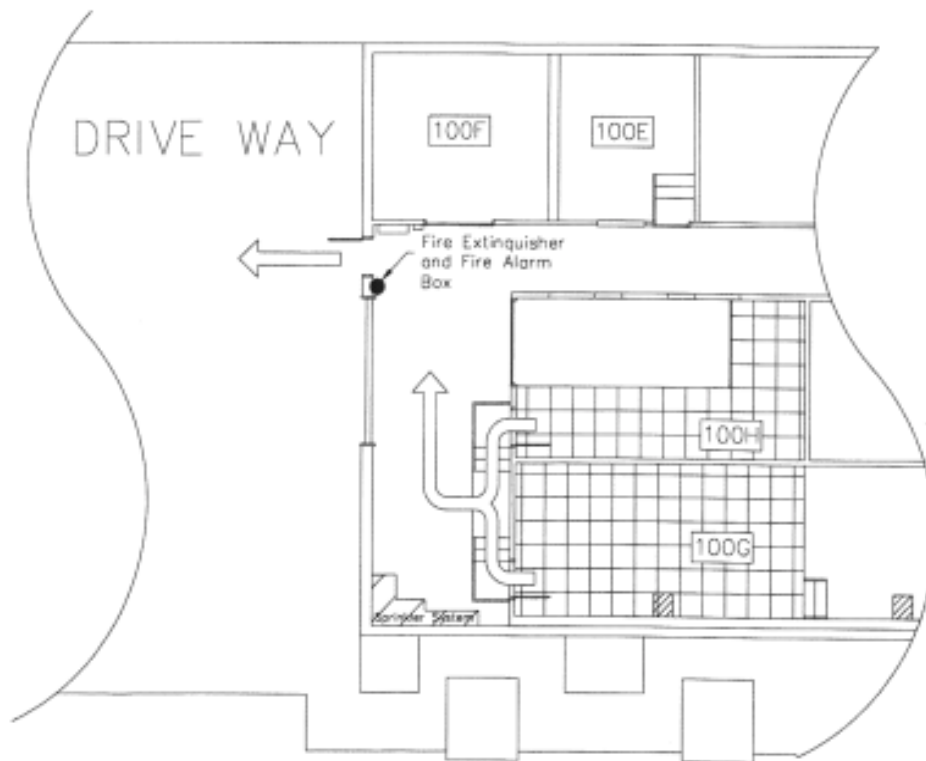


Figure 1-1   241 Facility Clean Room Emergency Exits

Primary Assembly Area

DRIVE WAY

Building 241

SIDEWALK

PARKING LOT
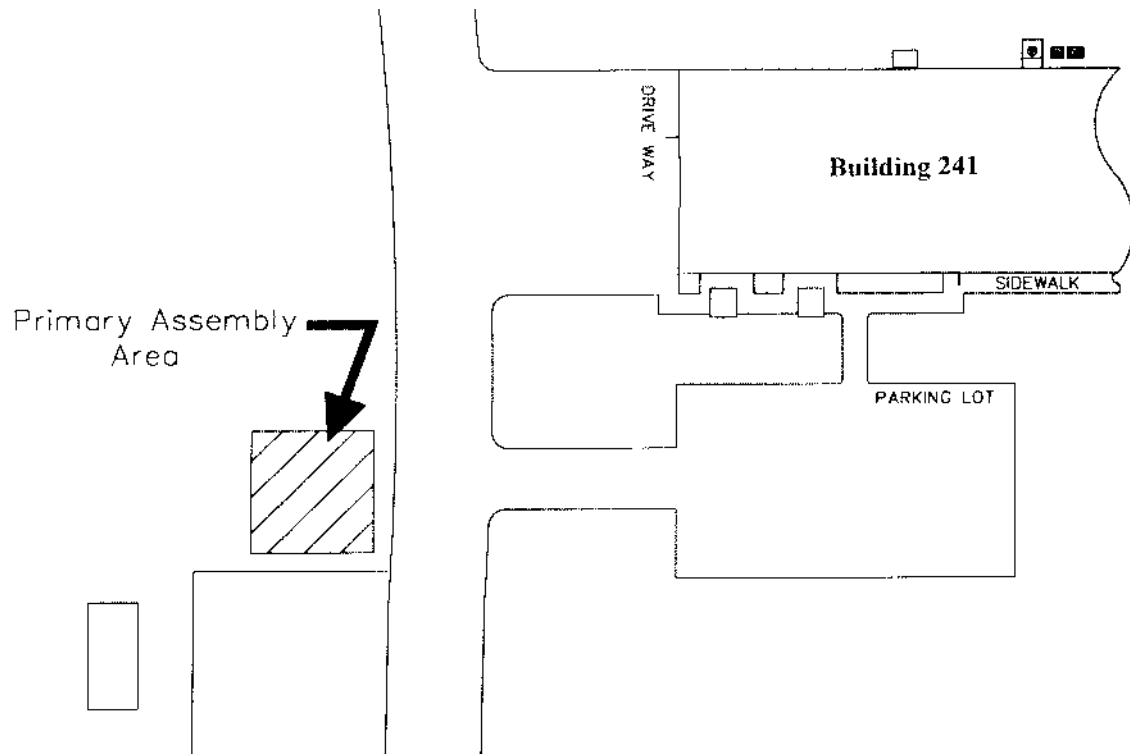
Figure 1-2   241 Facility Emergency Meeting Place

Emergency/Accident Reporting

The Facility Engineer has the primary responsibility of initiating the notification process.  General Emergency Instructions:

(1)  Sound the alarm and evacuate the area.
(2)  If safe, render/de-energize energy systems.
(3)  Initiate Flash reporting sequence.
(4)  Establish emergency response team to support follow on action.

Figure 1-3 shows the JSC Emergency Number and Reporting Sequence. This number is a coordinated number for the emergency related medical, fire and security groups at JSC.

## First Level                    ## Second Level

```
┌─────────────────────┐
│    CALL 33333       │
└─────────────────────┘
          │
┌─────────────────────┐
│       CALL          │
│  Sharad  Bhaskaran  │
│   (281) 335-2939    │
│ Pager (281) 527-9720│
└─────────────────────┘
          │
┌─────────────────────┐
│       CALL          │
│    Ed Strong        │
│     45881           │
│ Pager (281) 434-5130│
└─────────────────────┘
          │
┌─────────────────────┐
│       CALL          │
│  Hanan Harpster     │
│     33198           │
│ Pager (281) 434-5070│
└─────────────────────┘
          │
┌─────────────────────┐
│       CALL          │
│  James  Rodriguez   │
│     38718           │
│ Page (281) 527-2002 │
└─────────────────────┘
```

```
┌─────────────────────────┐
│  Fill Out Flash Report  │
│ Electronic Form SEAT 094│
│ (Example in Appendix A)  │
└─────────────────────────┘
           │
┌─────────────────────────┐
│  E-Mail Flash Report to │
│     Gloria  Salinas     │
│                         │
│ gloria.salinas@lmco.com │
└─────────────────────────┘
```
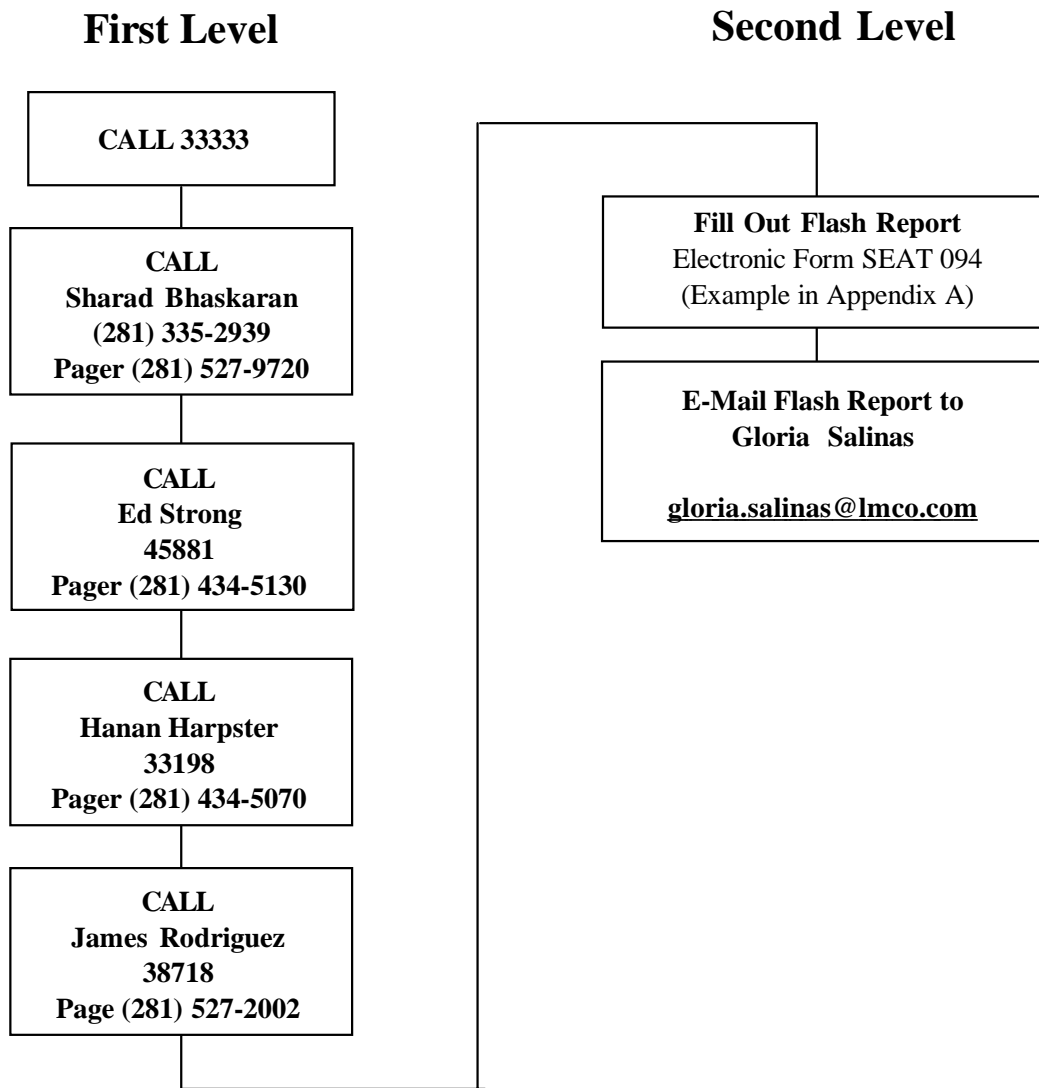
Figure 1-3    JSC Emergency Number and Reporting Sequence

## Systems Emergency Procedures

The following procedures are to be carried out by the Test Conductor and Test Personnel in accordance with the condition as defined below:

| CONDITION | RESPONSIBILITY | ACTION |
|---|---|---|
| Fire/Visible Smoke in Test Area | Test Conductor/Technician | Abort Test |

(1) Sound the alarm: Activate alarm at pull box and/or phone in emergency.
(2) Do not move injured personnel unless necessary to prevent further injury.
(3) If safe, attempt to de-energize system, i.e. thermal, electric, etc.
(4) Initiate notification process.  This may be conducted away from the situation from a telephone.

| CONDITION | RESPONSIBILITY | ACTION |
|---|---|---|
| Electrical burn/smoke odor | Test Conductor/Technician | Terminate Test |

(1) Shutdown all electrical test equipment systems.
(2) Locate nearest fire extinguisher.
(3) Investigate/Isolate the source of odor.
(4) If required, perform steps associated with a Fire/Smoke situation.

| CONDITION | RESPONSIBILITY | ACTION |
|---|---|---|
| Loss of Facility Power | Test Conductor/Technician | Hold & Evaluate |

(1) Evaluate the situation and impact to test.  Investigate the cause and potential frequency of occurrence.  Take appropriate steps to restore the failed systems to their nominal/safe operating conditions.

## Personnel Emergency/Accident Procedures

| CONDITION | RESPONSIBILITY | ACTION |
|---|---|---|
| Serious Personal Injury | Test Conductor/Technician | Terminate Test |

(1) To prevent further injury, do not move the injured personnel unless necessary.
(2) Render the area safe, then administer first aid as required.
(3) Initiate notification process.

Do not leave injured personnel alone until emergency personnel arrive.

| CONDITION | RESPONSIBILITY | ACTION |
|---|---|---|
| Minor Personal Injury | Test Conductor/Technician | Hold & Evaluate |

(1)  Render the area safe, then administer First Aid as required.
(2)  Initiate notification process.
(3)  Take injured individual to medical treatment facility.

1.3.8     Hazardous Waste Handling

Hazardous material identification, labeling and storage at Building 241 shall be done according to JSC Form 1161, "Disposal Inventory for Miscellaneous Hazardous Wastes."  Disposal containers, transportation and disposal will be provided by the designated JSC waste management service.  All Internal Thermal Control System (ITCS) waste disposal in Building 241 should be coordinated through the Facility Manager.

## 2.0    APPLICABLE DOCUMENTATION

The following documents form a part of this Verification Plan to the extent specified.  Tasks and activities referenced in pre-test, post-test, and procedural sequences may be performed using the most recent revision of the document stated.

NASA Documents:

| Number | Rev. | Title |
|---|---|---|
| JHB 5322 | C | Contamination Control Requirements Manual |
| KHB 1700.7 | LI | Space Shuttle Payload Group Safety Handbook |
| LS-71135-3 | A | Human Research Facility Integration Flight Prototype Rack Interface Verification Test |
| NT1-ADM-012 | Base-line | Task Performance Sheet (TPS) NT/Occupational Safety and Institutional Assurance Division |
| NT1-ADM-013 | A | Quality Assurance Record Center Discrepancy Reporting and Tracking Systems |
| SSP57400 | | Human Research Facility Unique Payload Verification Plan for Rack 1, International Space Program |
| LS-71139-2 | B | HRF Flight Rack One Integration Test Procedure II: Payload Rack Checkout Unit Mechanical Operations and Fluid Sampling |
| LS-71139-5 | B | HRF Flight Rack One Integration Test Procedure V: Rack Activation/Deactivation |

Boeing Documents:

| Number | Rev. | Title |
|---|---|---|
| D683-44094-2 | A | Human Research Facility Flight Rack Command & Data Handling (C&DH) Acceptance Test Procedure |
| D683-27519-1 | G | User Guide for the Payload Rack Checkout Unit (PRCU) |

## 2.1    APPLICABLE SOFTWARE

The following software provides the configuration data used in this test setup:

Payload HRF Rack Configurations are based upon:

| Software Item | Version |
|---|---|
| Rack Interface Controller (RIC) | Expedite the Processing of Experiments to Space Station (EXPRESS) -9 |
| EXPRESS Laptop | EXPRESS HH |

PRCU Software Configurations are based upon:

| Software Item | Version |
| --- | --- |
| Payload Rack Check-out Unit (PRCU) | PRCU Block 2.0 |
| Payload Executive Processor (PEP) | PEP Version 18 |

HRF Software Configurations are based upon:

| Software Item | Version |
| --- | --- |
| Common Software | Block 2.3 |
| Commercial-Off-The-Shelf (COTS) Applications | N/A |
| Instrument Applications | N/A |
| Experiment Applications | N/A |
| Workstation software | Load 5.0 |
| Ultrasound Software | Rev 108.17 |
| Gas Analyzer System for Metabolic Analysis of Physiology (GASMAP) Software | I/F Shell:  1AX20 Random Access Mass Spectrometer (RAMS):  1AX60 |

3.0        TESTING PROCESS OVERVIEW

3.1        TESTING OBJECTIVE

The test objectives are as follows:

- Facilitate the successful connection of the HRF Rack with the PRCU ISPR panel.
- Perform off-line functional checks prior to the installation of the payload into the HRF Rack.
- Perform functional checkout tests of the empty Payload HRF Rack.
- Facilitate successful disconnection of the HRF Rack to the PRCU ISPR panel.

3.2        TEST REQUIREMENTS

The following paragraphs describe the requirements of the specific tests to be conducted and may include references to the specific Verification Requirements Data Sheet (VRDS) to be completed.

3.3        TEST CONDITIONS

3.3.1      Test Conduct Ground Rules

The rules as defined in the following subparagraphs will be followed during all test activities.

3.3.2      Roles and Responsibilities

The Test Conductor is responsible for the overall management and integration of all verification testing at the systems level. The Test Conductor is responsible for the safe, successful control and conduct of all testing. The Test Conductor will assure all test team members are knowledgeable of the subsystems required for the verification test to be performed. The conductor acquires and assigns test resources and is responsible for the adequacy of test documentation. Additional responsibilities are:

- Test schedule coordination
- Test resource management
- Assurance of efficient test conduct
- Data and reports coordination

The Test Engineer is responsible for conducting the specific verification testing, including the coordination of test materials and personnel. The Test Engineer provides the test configuration, test plan and required

paperwork/procedures.  The Test Engineer is the principal technical focal point for a given test.  The Test Engineer coordinates all test data processing and supports the Test Conductor in the preparation of the post test report.

The Facility Engineer is the member responsible for ensuring that the required instrumentation is calibrated, installed and conditioned to provide the data necessary to meet the test objectives.  The Facility Engineer is responsible for the coordination of certified Test Technician/Test Operator support.

The Test Technician/Test Operator is responsible for selection, setup, operation, maintenance and configuration of the test equipment in accordance with the approved test plan and procedure.

3.3.2.1    Test Area Requirements

Special emphasis is to be given to testing flight articles.  The following rules will be incorporated into test documentation and compliance is the responsibility of all test team members.  Repeated non-compliance may be grounds for denial of access to the test facility.

3.3.2.2    Test Area Cleanliness

Room 100H in Building 241 is certified as a level 100K clean room. Requirements for working in such an environment are detailed in Contamination Control document, JHB 5322C.  All test team members with access to room 100H shall be familiar with these requirements and may undergo pre-access training or certification at the discretion of the Facility Engineer.  The following rules shall be maintained at all times while in the test facility:

- Smocks, head and beard covers, shall be worn at all times.
- Test Area will be kept clean and orderly at all times.
- All debris created during test preparation, conduct, or tear down will be continuously removed to prevent Foreign Object Damage (FOD) contamination.

3.3.2.3    Test Area Access

Access to all test areas shall be limited  during test operations.  Only essential personnel shall be admitted.  The test area, surrounding test consoles, and test instrumentation shall be controlled to restrain visitors and prevent tampering with the test article or test equipment. Determination of essential personnel will be made by the Test Conductor or Test Engineer, and enforced by the Facility Engineer.

3.3.2.4    Work Area Rules

The following work rules shall be observed for the duration of testing:

- All work stands shall have toe boards sufficient to prevent any item from being accidentally dropped into a test article.
- All work stands shall have the side accessing the test article padded to prevent test article damage in the event the stand comes in contact with the test article.
- Rings and watches must be taped or removed.

3.3.2.5    Temporary Configuration Changes

Temporary changes to the Test Article configuration will be accomplished and documented as described in document NT1-ADM-012 TPS NT/Occupational Safety and Institutional Assurance Division.

## 4.0    TPS AUTHORIZED PERSONNEL

The TPS Authorization is comprised of two (2) types:

- Type A – A Task Performance Sheet that changes the temporary or permanent configuration of the "Flight" (Class I) or Ground Support Equipment (GSE) test hardware. These documents must be reviewed and agreed upon by the customer before obtaining a NASA Signature. Absolutely no work is to be performed without having the proper paperwork in hand with the appropriate signatures.

- Type B – A Task Performance Sheet that does not change the configuration of the hardware which is being tested. These documents, do not require a NASA Signature, and are to be coordinated with the customer and submitted for signature.

All documents must have the signature of the Lockheed Martin engineer authority in charge of verification.

If documents require hardware to be pulled out of bond; the appropriate signature authority for the bond room must be included. This list is for reference purposes only, verify before use. The official list is provided in NASA EA 5 memo.

## LIST OF AUTHORIZED SIGNATURES

| Project ID | Project Name | New Project ID | New Project Name | NASA Technical Monitor | Mission Assigned | Other Authorized Signatures |
|---|---|---|---|---|---|---|
| HPMHPMS1 | Integration Hardware Definition & Development/Ground Rack Design and Build | HPMS | High Fidelity Mockup/Ground Development Facility/Launch Integration Facility/Payload Rack Checkout Unit | Ed Strong | HRF | Sharad Bhaskaran Robert Henneke Bob Trittipo Tom Wiggins Elton Witt |
| HPM1 | Ground Facilities Development | Deleted – Content moved to HPMS | | | | |
| HPM3 | Water Cooled Rack Development | HPM3 | Flight Prototype Rack Integration/Flight Rack Integration | Ed Strong | HRF | Carlos Aquilar Sharad Bhaskaran Todd Leger Kevin Upham |
| HPCP | HRF Launch Package 1 Hardware Design | Deleted – Content moved to HPM3 | | | | |
| MEIT | Multiple Element Integration Test (MEIT) | Deleted – Content moved to HPM3 | | | | |

5.0    <u>TEST SET UP</u>

The test set-up and tear down will be governed by Task Performance
Sheets (TPS) JSC form 1225.

5.1    PRE-TEST ACTIVITY

N/A

5.2    POST-TEST ACTIVITY

N/A

## 6.0 TEST PROCEDURE

The following procedure contains steps to mechanically connect/disconnect the HRF Rack to/from the PRCU test environment, perform an interface check between the HRF Rack and PRCU, and to execute individual functional checks of payload drawers. The PRCU provides a testing environment that will aid in the closure of verifications of the empty HRF Rack.

## 6.1 MATING OF PAYLOAD RACK TO INTERNATIONAL STANDARD PAYLOAD RACK (ISPR) PANEL

The following sections detail the interface connections between the HRF Rack and the PRCU test environment. Several connections can be made at the discretion of the test conductor. These connections are dependent upon the test to be performed including: Flight Data System (FDS) Maintenance, Vacuum and $GN_2$.

**NOTE**: The Utility Area Close-out T-Bar Assy may remain in configuration or be removed to prevent interference with future activities, per the discretion of the test conductor.

### 6.1.1 Pre-Mate Checks

Before connecting any hardware, an inspection must occur to verify that no damage has occurred to the connector. If a connector is damaged, the hardware cannot be connected. A DR must be written against the cable and the discrepant connector. The part must be replaced, or the hardware repaired. The DR is dispositioned before proceeding on with connecting the HRF Rack to the PRCU test environment.

### TABLE 6.1  PRE-MATE CHECKS

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 1. | Verify the following:<br>• PRCU fluid sample is in spec per SSP30573<br>• Programmable Electrical Power System Emulator (PEPSE) facility breaker is OFF | | |
| 2. | Inspect the following hardware for damage and record serial numbers:<br>Item               P/N<br>Main Pwr Connector<br>Saver Assy        683-27524-1<br>Auxiliary (AUX) Pwr<br>Connector Saver Assy  683-27524-2<br>1553B Bus A Con-<br>Connector Saver Assy  683-27524-3<br>1553B Bus B Con-<br>Connector Saver Assy  683-27524-4 | | |

TABLE 6.1  PRE-MATE CHECKS (CONT'D)

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|-----------|-----------|
|  | High Rate Data Link (HRDL) Connector Saver Assy          683-27524-5 Video Connector Saver Assy          683-27524-6 |  |  |
| 3. | Inspect the following hardware for damage and record serial numbers: Item                    P/N FDS Connector Saver Assy          683-27524-7 Local Area Network (LAN) 1 Connector Saver Assy          683-27524-8 LAN 2 Connector Saver Assy          683-27524-9 Video Connector Saver Assy          683-27524-10 1553 Address Terminator         SEG38116104-301 |  |  |
| 4. | Inspect the following hardware for damage and record serial numbers: Mod Thermal Control System (TCS) Supply Connector Saver Assy  683-27554-2  Mod TCS Return Connector Saver Assy  683-27554-4 |  | N/A:_____  T:_____  QA:_____ |
| 5. | Inspect the following hardware for damage and record serial numbers: Mod TCS Supply          683-27554-2 GSE Transfer Supply Hose               SKL83-45519-3 GSE Transfer Return Hose               SKL83-45519-2 |  | N/A:_____  T:_____  QA:_____ |

T:_____   QA:_____

## 6.1.2      Moderate Temperature Cooling Interface

There are two (2) possible methods for mating the HRF Rack to the PRCU Moderate Temperature Cooling System.  The PRCU connector saver assemblies, or the GSE Transfer Hoses and Accumulator can be utilized. The test conductor determines which method should be used.  System operating procedures are dependant upon the method used and must be developed accordingly.  The method used will be noted on the TPS.

## 6.1.2.1    PRCU Connector Savers

The PRCU thermal connector savers are for use with the HRF Rack and do not contain any valves.  A self-sealing Quick Disconnect (QD) Connector is located at each end of the hose.  Once mated, the only valves for controlling thermal flow are the automated valves in the test environment and the flight rack.

## TABLE 6.2  PRCU CONNECTOR SAVERS

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 1. | | Disconnect the following hardware:<br>• Thermal Control System (TCS) Mod Supply hose from T-Bar Assy | |
| 2. | | Inspect the following hardware for damage:<br>• TCS Mod Supply hose<br>• Connector Saver (CS) Assy 683-27554-2 | |
| 3. | | Connect the following hardware:<br>• TCS Mod Supply hose P/N to CS Assy P/N 683-27554-2.  Remove Cap cover from TCS Mod Hose by turning and pulling to remove from the bottom | |
| 4. | Connect the following hardware:<br>• CS Assy P/N 683-27554-2 to ISPR Panel (MOD TEMP TCS SUPPLY) | | |
| 5. | | Disconnect the following hardware:<br>• TCS Mod Return hose from T-bar Assy | |
| 6. | | Inspect the following hardware for damage:<br>• TCS Mod Return hose<br>• CS Assy 683-27524-4 | |
| 7. | | Connect the following hardware:<br>• TCS Mod Return hose to CS Assy P/N 683-27524-4 | |
| 8. | Connect the following hardware:<br>• CS Assy P/N 683-27524-4 to ISPR Panel (MOD TEMP TCS RETURN) | | |
| 9. | Visually inspect hoses for leaks. | | |
| 10. | | Connect the following hardware:<br>• TCS Mod Supply hose to T-bar Assy<br>• TCS Mod Return hose to T-bar Assy | N/A:_____  T:_____  QA:_____ |

T:_____   QA:_____

### 6.1.2.2    GSE Transfer Hose

The GSE transfer hoses contain manual inlet and outlet valves.  The return hose contains an accumulator that offsets the changes in pressure when the rack is in transit.

## TABLE 6.3  GSE TRANSFER HOSE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 1. | | Verify the following:<br>• GSE Transfer Supply<br>• Hose Valve                          - closed<br>• GSE Transfer Return<br>• Hose Valve                          - closed | |

TABLE 6.3  GSE TRANSFER HOSE (CONT'D)

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 2. | | Disconnect the following hardware:<br>• TCS Mod Supply hose from T-bar Assy | |
| 3. | | Inspect the following hardware for damage:<br>• TCS Mod Supply hose<br>• GSE Transfer Supply Hose | |
| 4. | | Connect the following hardware:<br>• TCS Mod Supply hose is mated to GSE Transfer Supply hose P/N SK683-45519-3 | |
| 5. | Connect the following hardware:<br>• GSE Transfer Supply hose P/N SK683-45519-3 to ISPR Panel (MOD TEMP TCS SUPPLY) | | |
| 6. | | Disconnect the following hardware:<br>• TCS Mod Return hose from T-bar Assy | |
| 7. | | Inspect the following hardware for damage:<br>• TCS Mod Return hose P/N<br>• GSE Transfer Return Hose | |
| 8. | | Verify the following:<br>• TCS Mod Return hose is mated to GSE Transfer Return hose P/N 683-27554-4<br>• GSE Transfer Return hose | |
| 9. | Connect the following hardware:<br>• GSE Transfer Return hose SK683-45519-2 to ISPR Panel (MOD TEMP TCS RETURN) | | |
| 10. | Visually inspect hoses for leaks. | | |
| 11. | | Connect the following hardware:<br>• TCS Mod Supply hose to T-bar Assy<br>• TCS Mod Return hose to T-bar Assy | N/A:_____  T:_____  QA:_____ |

T:_____   QA:_____

## 6.1.3  GN$_2$ Interface

The GN$_2$ interface provides the HRF Rack with a supply of gaseous nitrogen.

### TABLE 6.4  GN$_2$ INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 1. | | Disconnect the following hardware:<br>• GN$_2$ hose from T-bar Assy | |
| 2. | | Inspect the following hardware for damage:<br>• GN$_2$ hose<br>• CS Assy 683-27587-1 | |
| 3. | | Connect the following hardware:<br>• GN$_2$ hose P/N to CS Assy P/N 683-27587-1 | |
| 4. | Connect the following hardware:<br>• CS Assy P/N 683-27587-1 to ISPR Panel (GN$_2$) | | |
| 5. | | Connect the following hardware:<br>• GN2 hose to T-bar Assy | N/A:_____  T:_____  QA:_____ |

T:_____   QA:_____

### 6.1.4    Vacuum Interface

TABLE 6.5  VACUUM INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 1. | | Disconnect the following hardware:<br>• Vacuum Resource hose from T-bar Assy | |
| 2. | | Inspect the following hardware for damage:<br>• Vacuum Resource hose<br>• CS Assy P/N 683-27552-1 | |
| 3. | | Connect the following hardware:<br>• Vacuum Resource hose<br>• CS Assy P/N 683-27552-1 | |
| 4. | Connect the following hardware:<br>• CS Assy P/N 683-27552-1 to ISPR Panel Vacuum Resource System (VRS) | | |
| 5. | | Disconnect the following hardware:<br>• Vacuum Waste hose from T-bar Assy | |
| 6. | | Inspect the following hardware for damage:<br>• Vacuum Waste hose<br>• CS Assy P/N 683-27552-2 | |
| 7. | | Connect the following hardware:<br>• Vacuum Waste hose to CS Assy P/N 683-27552-2 | |
| 8. | Connect the following hardware:<br>• CS Assy P/N 683-27552-2 to ISPR Panel Vacuum Exhaust System (VES) | | |
| 9. | | Connect the following hardware:<br>• Vacuum Resource hose to T-bar Assy<br>• Vacuum Waste hose to T-bar Assy | N/A:_____  T:_____  QA:_____ |

T:_____   QA:_____

### 6.1.5    Power Interfaces

### 6.1.5.1    Main Power Interface

TABLE 6.6  MAIN POWER INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 1. | Verify the following:<br>• POWER (J1) Light Emitting Diode (LED) is off<br>• AUX POWER (J2) LED is off | | |
| 2. | Disconnect the following hardware:<br>• Dust cap from ISPR panel (J1) | | |
| 3. | | Disconnect the following hardware:<br>• Utility Interface Panel (UIP)-P1 Cable from HRF Rack (Dust cap J1) | |
| 4. | | Inspect the following hardware for damage:<br>• UIP-P1 Cable<br>• CS Assy (J1) P/N 683-27524-1 | |

# TABLE 6.6  MAIN POWER INTERFACE (CONT'D)

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 5. | | Connect the following hardware:<br>• UIP-P1 to CS Assy (J1) P/N 683-27524-1<br>• CS Assy (E1) P/N 683-27524-1 to Rack Handler Base P/N 220G07455-001 | |
| 6. | Connect the following hardware:<br>• CS Assy (P1) P/N 683-27524-1 to ISPR Panel (J1 POWER) | | |

T:_____  QA:_____

## 6.1.5.2     Auxiliary Power Interface

### TABLE 6.7  AUXILIARY POWER INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 1. | Verify the following:<br>• POWER (J1) LED          - off<br>• AUX POWER (J2) LED       - off | | |
| 2. | Disconnect the following hardware:<br>• Dust cap from ISPR panel (J2) | | |
| 3. | | Disconnect the following hardware:<br>• UIP-P2 Cable from HRF Rack (Dust cap J2) | |
| 4. | | Inspect the following hardware for damage:<br>• UIP-P2 Cable<br>• CS Assy P/N 683-27524-2 | |
| 5. | | Connect the following hardware:<br>• UIP-P2 to CS Assy (J2) P/N 683-27524-2<br>• CS Assy (E1) P/N 683-27524-2 to HRF Rack Handler Base P/N 220G07455-001 | |
| 6. | Connect the following hardware:<br>• CS Assy (P2) P/N 683-27524-2 to ISPR Panel (J2 AUX POWER) | | |

T:_____  QA:_____

## 6.1.6     Video Interface

### TABLE 6.8  VIDEO INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 1. | Verify the following:<br>• Main Power (J1) LED        - off<br>• AUX Power (J2) LED         - off | | |
| 2. | Disconnect the following hardware:<br>• Dust cap from ISPR panel (J16) | | |
| 3. | | Disconnect the following hardware:<br>• UIP-P16 Cable from HRF Rack (Dust cap J16) | |

## TABLE 6.8  VIDEO INTERFACE (CONT'D)

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|-----------|-----------|
| 4. | | Inspect the following hardware for damage:<br>• UIP-P16 Cable<br>• CS Assy P/N 683-27524-6 | |
| 5. | | Connect the following hardware:<br>• UIP-P16 to CS Assy (J16) P/N 683-27524-6 | |
| 6. | Connect the following hardware:<br>• CS Assy (P16) P/N 683-27524-6 to ISPR Panel (J16 VIDEO, LINE 1)<br>• CS Assy (P16) P/N 683-27524-6 to ISPR Panel (J16 VIDEO, LINE 2)<br>• CS Assy (P16) P/N 683-27524-6 to ISPR Panel (J16 VIDEO, SYNC) | | |
| 7. | | Disconnect the following hardware:<br>• UIP-P77 Cable from HRF Rack (Dust cap J77) P/N SEG46117303-301 | N/A:_____ T:_____ QA:_____ |
| 8. | | Inspect the following hardware for damage:<br>• UIP-P77 Cable<br>• CS Assy P/N 683-27524-10 | N/A:_____ T:_____ QA:_____ |
| 9. | | Connect the following hardware:<br>• UIP-P77 to CS Assy (J77) P/N 683-27524-10 | N/A:_____ T:_____ QA:_____ |
| 10. | Connect the following hardware:<br>• CS Assy (P77) P/N 683-27524-10 to ISPR Panel (J77 VIDEO) | | N/A:_____ T:_____ QA:_____ |

T:_____  QA:_____

## 6.1.7       HRDL Interface

## TABLE 6.9  HRDL INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|-----------|-----------|
| 1. | Verify the following:<br>• POWER (J1) LED          - off<br>• AUX POWER (J2) LED       - off | | |
| 2. | Disconnect the following hardware:<br>• Dust cap from ISPR panel (J7) | | |
| 3. | | Disconnect the following hardware:<br>• UIP-P7 Cable from HRF Rack (Dust cap J7) | |
| 4. | | Inspect the following hardware for damage:<br>• UIP-P7 Cable<br>• CS Assy P/N 683-27524-5 | |
| 5. | | Connect the following hardware:<br>• UIP-P7 to CS Assy (J7) P/N<br>• 683-27524-5 | |
| 6. | Connect the following hardware:<br>• CS Assy (P1) P/N 683-27524-5 to ISPR Panel (J7-TX HRDL) | | |

T:_____  QA:_____

### 6.1.8    FDS Maintenance Interface

#### TABLE 6.10  FDS MAINTENANCE INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 1. | Verify the following:<br>• POWER (J1) LED         - off<br>• AUX POWER (J2) LED     - off | | |
| 2. | Disconnect the following hardware:<br>• Dust cap from ISPR panel (J43) | | |
| 3. | | Disconnect the following hardware:<br>• UIP-P43 Cable from HRF Rack (Dust cap J43) | |
| 4. | | Inspect the following hardware for damage:<br>• UIP-P43 Cable<br>• CS Assy P/N 683-27524-7 | |
| 5. | | Connect the following hardware:<br>• UIP-P43 to CS Assy (J43) P/N 683-27524-7 | |
| 6. | Connect the following hardware:<br>• CS Assy (P43) P/N 683-27524-7 to ISPR Panel (J43 FDS Maintenance) | | |

T:_____   QA:_____

### 6.1.9    1553B Interfaces

### 6.1.9.1    Bus A Interface

#### TABLE 6.11  BUS A INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 1. | Verify the following:<br>• POWER (J1) LED         - off<br>• POWER (J2) LED         - off | | |
| 2. | Disconnect the following hardware:<br>• Dust cap from ISPR panel (J3) | | |
| 3. | | Disconnect the following hardware:<br>• UIP-P3 Cable from HRF Rack (Dust cap J3) | |
| 4. | | Inspect the following hardware for damage:<br>• UIP-P3 Cable<br>• CS Assy P/N 683-27524-3 | |
| 5. | | Connect the following hardware:<br>• UIP-P3 to CS Assy (J3) P/N 683-27524-3<br>• CS Assy (P7) P/N 683-27524-3 to 1553 ADDRESS TERMINATOR Assy (J7) P/N SEG38116104-301 S/N 1001 | |
| 6. | Connect the following hardware:<br>• CS Assy (P1) P/N 683-27524-3 to ISPR Panel (J3 BUS A) | | |

T:_____   QA:_____

### 6.1.9.2    Bus B Interface

#### TABLE 6.12  BUS B INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 1. | Verify the following:<br>• POWER (J1) LED          - off<br>• POWER (J2) LED          - off | | |
| 2. | Disconnect the following hardware:<br>• Dust cap from ISPR panel (J4) | | |
| 3. | | Disconnect the following hardware:<br>• UIP-P4 Cable from HRF Rack (Dust cap J4) | |
| 4. | | Inspect the following hardware for damage:<br>• UIP-P4 Cable<br>• CS Assy P/N 683-27524-4 | |
| 5. | | Connect the following hardware:<br>• UIP-P4 to CS Assy (J4) P/N 683-27524-4 | |
| 6. | Connect the following hardware:<br>• CS Assy (P1) P/N 683-27524-4 to ISPR Panel (J4 BUS B) | | |

T:_____   QA:_____

### 6.1.10    <u>LAN Interfaces</u>

### 6.1.10.1    LAN 1 Interface

#### TABLE 6.13  LAN 1 INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 1. | Verify the following:<br>• POWER (J1) LED          - off<br>• POWER (J2) LED          - off | | |
| 2. | Disconnect the following hardware:<br>• Dust cap from ISPR panel (J46) | | |
| 3. | | Disconnect the following hardware:<br>• UIP-P46 Cable from HRF Rack (Dust cap J46) | |
| 4. | | Inspect the following hardware for damage:<br>• UIP-P46 Cable | |
| 5. | | Connect the following hardware:<br>• UIP-P46 to CS Assy (J46) P/N 683-27524-8 | |
| 6. | Connect the following hardware:<br>• CS Assy (P1) P/N 683-27524-8 to ISPR Panel (J46 LAN 1) | | |

T:_____   QA:_____

### 6.1.10.2    LAN 2 Interface

#### TABLE 6.14  LAN 2 INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 1. | Verify the following:<br>• POWER (J1) LED          - off<br>• POWER (J2) LED          - off | | |
| 2. | Disconnect the following hardware:<br>• Dust cap from ISPR panel (J47) | | |
| 3. | | Disconnect the following hardware:<br>• UIP-P47 Cable from HRF Rack (Dust cap J47) | |
| 4. | | Inspect the following hardware for damage:<br>• UIP-P47 Cable<br>• CS Assy P/N 683-27524-9 | |
| 5. | | Connect the following hardware:<br>• UIP-P47 to CS Assy (J47) P/N 683-27524-9 | |
| 6. | Connect the following hardware:<br>• CS Assy (P1) P/N 683-27524-9 to ISPR Panel (J47 LAN 2) | | |

T:_____   QA:_____

### 6.2       EMPTY RACK TESTS

### 6.2.1       Power

This section details the procedures to perform the power test on the empty HRF Rack.  This test verifies the electrical power system of the HRF Rack.  The purpose of this test is to ensure that the HRF Rack meets the VRDS criteria.

This test collects baseline power data for the Human Research Facility (HRF) Rack.  There is no pass/fail criteria associated with any data collection.  Test results are used to determine operational parameters during testing in the specific environment.  This test assumes that the test environment can provide sufficient simulation of the ISS Medium Temperature Cooling Loop (MTCL) and power systems.

The system flow sensors are monitored and compared to HRF Rack internal sensors.  The test environment power system voltage output is set and verified to 116vdc, 120vdc, and 126vdc demonstrating nominal rack operation.

After twenty (20) minutes, following power application to the HRF Rack, the following steps may be performed using the Primary Avionics Software System (PASS-1000 or the equivalent to collect Health and Status data.)

Once the Main Power sequence is completed, repeat using Auxiliary Power. Test results will be recorded on the Health and Status Data Sheet (Appendix A, Figure 10).

## TABLE 6.15  POWER

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 1. | | Verify the following mates:<br>• HRF Rack to PRCU ISPR Panel X<br>• HRF Rack to EXPRESS Laptop<br><br>**NOTE**:  This step can be used on all three (3) ISPR channels (X=1,2, or 3). | |
| 2. | | | Digital Volt Meter<br>Verify the following:<br>Main pwr sw               - off<br><br>Record the following information:<br>Model: _____<br>NASA Tag #: _____<br>Calibration #: _____<br>Calibration Date: _____ |
| 3. | Connect the following hardware:<br>• Digital Volt Meter to ISPR Panel X (TP1)<br><br>**NOTE**:  This step can be used on all three (3) ISPR channels (X=1,2, or 3). | | |
| 4. | Activate PEPSE Rack per document LS-71139-2, Section 6.0 | | |
| 5. | Activate Computational Rack per document LS-71139-2, Section 6.0 | | |
| 6. | Activate Data Acquisition and Process Controller (DAPC) Rack per document LS-71139-2, Section 6.0 | | |
| 7. | Activate Moderate Temperature Chiller per document LS-71139-2, Section 6.0 | | |
| 8. | | Activate PASS-1000 per document LS-71139-2, Section 6.0 | |
| 9. | | Initiate Command and Data Handling per document LS71139-2, Section 6.0 | |
| 10. | | HRF Rack, Front Panel<br>Verify the following:<br>• "Maintenance" sw       - on | |
| 11. | | | Digital Volt Meter<br>Main pwr sw               - on |
| 12. | PEPSE Rack, Front panel<br>Channel X Main:<br>Select:     "ARM" button<br>pwr sw                 - on<br><br>**NOTE**:  This step can be used on all ISPR channels (X=1, 2, or 3). | | |
| 13. | | ISPR Panel X<br>Verify the following:<br>• Power Indicator is orange<br><br>**NOTE**:  This step can be used on all ISPR channels (X=1, 2, or 3). | |

# TABLE 6.15  POWER (CONT'D)

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 14. | PEPSE Rack, Front Panel<br>Channel X Main<br>Record the following:<br>• Voltage: _____ V dc<br><br>**NOTE**: This step can be used on all ISPR channels (X=1, 2, or 3). | | |
| 15. | | ISPR Panel X, Using Digital Volt Meter (DVM)<br>Record the following:<br>• TP1 Voltage: _____ V dc<br><br>**NOTE**: This step can be used on all ISPR Channels (X=1, 2, or 3). | |
| 16. | | | Activate HRF Rack, EXPRESS Laptop per LS-71139-5 Section 6.0 |
| 17. | PASS-1000, "Monitor Control Panel…" Screen<br>Select:     "RUN" button<br>Select:     "STOP" button<br>Record Values in Appendix A Figure 10 | | |
| 18. | | | EXP Laptop,<br>Verify Voltage of HRF Rack |
| 19. | | | Deactivate HRF Rack, EXPRESS Laptop per LS-71139-5 Section 6.0 |
| 20. | PEPSE Rack, Front panel<br>Channel X Main:<br>pwr sw                                - on<br>Select:     "DISARM" button<br><br>**NOTE**: This step can be used on all ISPR channels (X= 1, 2, or 3). | | |
| 21. | | ISPR Panel X<br>Verify the following:<br>• Power Indicator           - off<br><br>**NOTE**: This step can be used on all ISPR channels (X=1, 2, or 3). | |
| 22. | PEPSE Rack, upper front panel<br>Select:     "VOLTS" button<br>Set Value:  116 V dc<br>Verify the following:<br>• "Volts" setting agrees with the value entered above. | | |
| 23. | PEPSE Rack, Front panel<br>Channel X Main:<br>Select:     "ARM" button<br>pwr sw                                - on<br><br>**NOTE**: This step can be used on all ISPR channels (X = 1, 2, or 3). | | |
| 24. | | ISPR Panel X<br>Verify the following:<br>• Power Indicator is orange<br><br>**NOTE**: This step can be used on all ISPR channels (X= 1, 2, or 3). | |

# TABLE 6.15  POWER (CONT'D)

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|-----------|-----------|
| 25. | PEPSE Rack, Front Panel<br>Channel X Main<br>Record the following:<br>• Voltage: _____ V dc<br><br>**NOTE**:  This step can be used on all ISPR channels (X=1, 2, or 3). | | |
| 26. | | ISPR Panel X, Using DVM<br>Record the following:<br>• TP1 Voltage: _____ V dc<br><br>**NOTE**:  This step can be used on all ISPR channels (X=1, 2, or 3). | |
| 27. | | | Activate HRF Rack, EXPRESS Laptop per LS-71139-5 Section 6.0 |
| 28. | PASS-1000 "Monitor Control Panel…" Screen<br>Select:      "RUN" button<br>Select:      "STOP" button<br>Record Values in Appendix A Figure 10 | | |
| 29. | | | EXP Laptop<br>Verify Voltage of HRF Rack |
| 30. | | | Deactivate HRF Rack, EXPRESS Laptop per LS-71139-5 Section 6.0 |
| 31. | PEPSE Rack, Front panel<br>Channel X Main:<br>pwr sw                                  - on<br>Select:      "DISARM" button<br><br>**NOTE**:  This step can be used on all ISPR channels (X=1, 2, or 3). | | |
| 32. | | ISPR Panel X<br>Verify the following:<br>• Power Indicator              - off<br><br>**NOTE**:  This step can be used on all ISPR channels (X=1, 2, or 3). | |
| 33. | PEPSE Rack, upper front panel<br>Select:      "VOLTS" button<br>Set Value:  126 V dc<br>Select:      "ACCEPT" button<br>Verify the following:<br>• "Volts" setting agrees with the value entered above | | |
| 34. | PEPSE Rack, Front panel<br>Channel X Main:<br>Select:      "ARM" button<br>pwr sw                                  - on<br><br>**NOTE**:  This step can be used on all ISPR channels (X=1, 2, or 3). | | |
| 35. | | ISPR Panel X<br>Verify the following:<br>• Power Indicator is orange<br><br>**NOTE**:  This step can be used on all ISPR channels (X=1, 2, or 3). | |
| 36. | PEPSE Rack, Front Panel<br>Channel X Main<br>Record the following:<br>• Voltage: _____ V dc<br><br>**NOTE**:  This step can be used on all ISPR channels (X=1, 2, or 3). | | |

## TABLE 6.15  POWER (CONT'D)

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 37. | | ISPR Panel X, Using DVM<br>Record the following:<br>• TP1 Voltage: _____ V dc<br><br>**NOTE**:  This step can be used on all ISPR channels (X=1, 2, or 3). | |
| 38. | | | Activate HRF Rack, EXP Laptop per LS-71139-5 Section 6.0 |
| 39. | PASS-1000 "Monitor Control Panel…" Screen<br>Select:      "RUN" button<br>Select:      "STOP" button<br>Record Values in Appendix A Figure 10 | | |
| 40. | | | EXP Laptop,<br>Verify Voltage of HRF Rack |
| 41. | | | Deactivate HRF Rack, EXPRESS Laptop per LS-71139-5 Section 6.0 |
| 42. | PEPSE Rack, Front panel<br>Channel X Main:<br>pwr sw                                  - on<br>Select:      "DISARM" button<br><br>**NOTE**:  This step can be used on all ISPR channels (X=1, 2, or 3). | | |
| 43. | | ISPR Panel X<br>Verify the following:<br>• Power Indicator              - off<br><br>**NOTE**:  This step can be used on all ISPR channels (X=1, 2, or 3). | |
| 44. | | Deactivate PASS-1000 per document LS71139-2, Section 6.0 | |
| 45. | | Deactivate PRCU Wrkstn per document LS71139-2, Section 6.0 | |
| 46. | Deactivate Moderate Temperature Chiller per document LS71139-2, Section 6.0 | | |
| 47. | Deactivate DAPC Rack per document LS-71139-2, Section 6.0 | | |
| 48. | Deactivate Computational Rack per document LS-71139-2, Section 6.0 | | |
| 49. | Deactivate PEPSE Rack per document LS-71139-2, Section 6.0 | | |

### 6.2.2      Thermal

TBD

### 6.2.3      Standard Interface Rack (SIR)/Breakout Box (BOB)

The purpose of the SIR/BOB Test is to test the power and data interfaces of HRF Rack One between the RIC and the Payload drawer locations (PDL). The ability to configure, activate and utilize each drawer location and the Front Panel (deployed payload) location will be demonstrated for the following:

- PDL power
- PDL to RIC
- RIC to PDL RS-422
- Ethernet communications
- PDL to RIC
- RIC to PDL Discretes
- PDL to RIC Analog

**NOTE**:  Unless otherwise stated, any of the following steps may be repeated and/or performed non-sequentially to accomplish the desired test objectives.

TABLE 6.16  SIR/BOB

| Step | PRCU | HRF Rack 1 | Payload |
|---|---|---|---|
| 1. | | | Configure the Test Support System (TSS) hardware per drawing SEG38115983<br><br>**NOTE**:  All IP addresses of 10.12.12 may be changed to 120.80.10 to be consistent with the HRF Rack RIC/IP addresses. |
| 2. | Perform PRCU startup per LS-71139-2 Section 6.0 | | |
| 3. | | Perform HRF Rack Activation per LS-71139-5 Section 6.0 | |
| 4. | | EXP Laptop; "EXPRESS – HRF" Screen<br>Select:        "EXPRESS Comm" button<br>Select:        "P/L Control" tab<br>Select:        "Payload Configuration" button<br>Configure the Deployed Payload Location for Port Number 1900 (hex), Function Code 100, and Internet Protocol (IP) Address 10.12.12.100 | |
| 5. | | | TSS Laptop, left side panel<br>Main pwr sw                          - on<br>Verify the LED is illuminated |
| 6. | | | TSS Laptop, "Windows 95" desktop<br>Select:        "Start" menu<br>Select:        "Settings"<br>Select:        "Control Panels"<br>Verify the following:<br>• "Control Panel" window appears |
| 7. | | | TSS Laptop, "Control Panel" Window<br>Select:        "Network"<br>Verify the following:<br>• "Network" window appears |
| 8. | | | TSS Laptop, "Network" Window<br>Select:        "TCP/IP -> 3 COM..."<br>Verify the following:<br>• "TCP/IP Properties" window appears |

TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|---|---|---|---|
| 9. | | | TSS Laptop, "TCP/IP Properties" Window<br>IP Address:<br>Set Value:        "10.12.12.100"<br>Select:           "OK" button<br><br>**NOTE**: If the IP Address is changed, the Laptop will need to be shutdown and power cycled for the change to take effect  (Shutdown and power-off the laptop and then repeat the previous step and this step). |
| 10. | | EXP Laptop, "EXPRESS Comm: P/L Control" Screen<br>Configure HRF Rack Locations 1 through 15 for Medium Rate Data Link (MRDL), RS-422 with Baud Rate 2400 and Function Codes 101 through 115, respectively | |
| 11. | | EXP Laptop, "EXPRESS Comm: P/L Control" Screen<br>Configure Discretes as inputs to Solid State Power Control Module (SSPCM) (outputs from payload drawers) for HRF Rack Locations 1 through 15 | |
| 12. | | EXP Laptop, "EXPRESS - Comm" Screen<br>Select:        "P/L Comm" tab<br>Select:          "Drawer Comm" button<br>For all configured Locations<br>Select:          "Enable" radio button<br>Select:          "Execute" button<br><br>**NOTE**:  The following steps 16 through 79, will be repeated eight (8) times using the values in Table 6.17 for each iterance.  The values from Table 6.17 are to be substituted for the corresponding bracketed '[ ]' labels for the appropriate iterations.  The QA buys for the steps for each iterance as indicated and will be signed off in Table 6.18.  This matrix will serve as the official record for completion of the steps. | |
| 13. | | HRF Rack, Front Panel<br>Subrack Location [A]:<br>Install BOB-1<br><br>**NOTE**:  Once drawer is installed, ensure lock handles are in place. | |
| 14. | | HRF Rack, Front Panel<br>Subrack Location [B]:<br>Install BOB-2<br><br>**NOTE**:  Once drawer is installed, ensure lock handles are in place. | |
| 15. | | EXP Laptop<br>Verify continuity for the following:<br>• Subrack Location [A]<br>• Subrack Location [B] | |
| 16. | | EXP Laptop, "EXPRESS EPS: Drawer Power" Screen<br>For Locations [A] and [B]<br>Select:        "On" radio  button<br>Select:          "Execute" button | |

## TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|------|------|-----------|---------|
| 17. | | HRF Rack, Upper Front Panel<br>Subrack [A] pwr sw       - on<br>Subrack [B] pwr sw       - on<br>Verify the following:<br>•   Subrack [A] LED is illuminated green<br>•   Subrack [B] LED is illuminated green | |
| 18. | | | TSS BOB 1, Front Panel<br>Data pwr sw       - on<br>Verify the Data LED is illuminated red |
| 19. | | | TSS BOB 2, Front Panel<br>Data pwr sw       - on<br>Verify the Data LED is illuminated red |
| 20. | | | TSS Signal Adapter Box (SAB), Front Panel<br>Verify the LED is illuminated green |
| 21. | | | TSS Laptop, "Windows 95" desktop<br>Select:      "Start" menu<br>Select:      "I&ES Simulator (Start).exe"<br>Verify the following is displayed:<br>•   " I&ES Configuration" Window |
| 22. | | | TSS Laptop, "I&ES Configuration" Window<br>Select:      "Two Simulators"<br><u>BOB-1/Sim-1</u>:<br>Select:      Comm Protocol "TCP/IP"<br>Set Value:   TCP/IP Port "6400:"<br>Set Value:   Function Code "100"<br><u>BOB-2/Sim-2</u>:<br>Select:      Comm Protocol "RS-422"<br>Set Value:    Baud rate "2400"<br>Set Value:    Function Code "[C]"<br>Select:      "START" button<br>Verify the following screens appear:<br>• "I&ES Sim-1 TCP/IP"<br>• "I&ES Sim-2 RS-422" |
| 23. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Verify the following:<br>• HRF Rack Voltage 28± 1V<br>• "Connection Established" is indicated<br>• "Transmission Control" LED is green |
| 24. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Set Value:      Select Request "10 " (data bytes)<br>Set Value:      Repetitions "2"<br>Set Value:      Frequency "1"<br>Verify the following request in "I&ES to RIC Request (Outgoing)" field:<br>• 55AA  0018  009C  0100  0001  009C  0000  0000  0000  0001  0002 |

TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|------|------|------------|---------|
| 25. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>"I&ES to RIC Request (Outgoing)" field:<br>Change the fifth word to value [D]<br>Verify the following request is indicated:<br>• 55AA  0018  009C  0100  [D]  009C  0000  0000  0000  0001  0002 |
| 26. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Select:          "SEND" button<br>Verify the following:<br>• Two (2) messages sent above appear in the "RIC to I&ES Messages (Incoming)" field of Sim-2 (RS-422)<br><br>**NOTE**:  An extra RS-422 checksum word is displayed at the end of the original message. |
| 27. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Discrete 1 & 2 Assignment "Write/Write"<br>Select:          "OK" button |
| 28. | | | TSS Laptop, "I&ES Sim-2 RS-422" Screen<br>Discrete 1 & 2 Assignment "Write/Write"<br>Select:          "OK" button |
| 29. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Set Value:          output discretes (2 each) "High" |
| 30. | | | TSS Laptop, "I&ES Sim-2 RS-422" Screen<br>Set Value:          output discretes (2 each) "High" |
| 31. | Health & Status Check<br>Verify the following:<br>• SSPCM Discrete Status Word [E], check that bits [F] = 11 binary | | |
| 32. | Health & Status Check<br>Verify the following:<br>• SSPCM Discrete Status Word [G], check that bits [H] = 11 binary | | |
| 33. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Set Value:          output discretes (2 each) "Low" (0) |
| 34. | | | TSS Laptop, "I&ES Sim-2 RS-422" Screen<br>Set Value:          output discretes (2 each) "Low" (0) |
| 35. | Health & Status Check<br>Verify the following:<br>• SSPCM Discrete Status Word [E], check that bits [F] = 00 binary | | |
| 36. | Health & Status Check<br>SSPCM Discrete Status Word [G], check that bits [H] = 00 binary | | |

# TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|------|------|-----------|---------|
| 37. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Discrete 1 & 2 Assignment "Read/Read"<br>Select:          "OK" button |
| 38. | | | TSS Laptop, "I&ES Sim-2 RS-422" Screen<br>Discrete 1 & 2 Assignment "Read/Read"<br>Select:          "OK" button |
| 39. | | EXP Laptop, "EXPRESS-EPS: Drawer Power" Screen<br>For Locations [A] and [B]<br>Select:          "Off" radio button<br>Select:          "Execute" button | |
| 40. | | EXP Laptop, "EXPRESS-Comm: Drawer Comm" Screen<br>For Locations [A] and [B]<br>Select:          "Inhibit" radio button<br>Select:          "Execute" button | |
| 41. | PRCU, "Payload Command Table"<br>Configure discretes as outputs from SSPCM (inputs to payload drawers) for HRF Rack Locations [A] and [B] | | |
| 42. | | EXP Laptop, "EXPRESS-Comm: Drawer Comm" Screen<br>For Locations [A] and [B]<br>Select:          "On" radio button<br>Select:          "Execute" button | |
| 43. | | EXP Laptop, "EXPRESS-Comm: Drawer Comm" Screen<br>For Locations [A] and [B]<br>Select:          "Enable" radio button<br>Select:          "Execute" button | |
| 44. | PRCU, "Payload Command Table"<br>Set both of the HRF Rack SSPCM discrete outputs for HRF Rack Location [A] to "High" (1) | | |
| 45. | PRCU, "Payload Command Table"<br>Set both of the HRF HRF Rack SSPCM discrete outputs for HRF Rack Location [B] to "High" (1) | | |
| 46. | Health & Status Check<br>SSPCM Discrete Status Word [E], check that bits [F] = 11 binary | | |
| 47. | Health & Status Check<br>SSPCM Discrete Status Word [G], check that bits [H] = 11 binary | | |
| 48. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Verify discretes for Sim-1 are both indicating "1" |
| 49. | | | TSS Laptop,  "I&ES Sim-2 RS-422" Screen<br>Verify discretes for Sim-2 are both indicating "1" |
| 50. | | EXP Laptop, "EXPRESS Comm: P/L Control"  Screen<br>Set both of the HRF Rack SSPCM discrete outputs for HRF Rack Location [A] to "Low" (0) | |

## TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|------|------|-----------|---------|
| 51. | | EXP Laptop, "EXPRESS Comm: P/L Control" Screen<br>Set both of the HRF Rack SSPCM discrete outputs for HRF Rack Location [B] to "Low" (0) | |
| 52. | Health & Status Check<br>SSPCM Discrete Status Word [E], check that bits [F] = 00 binary | | |
| 53. | Health & Status Check<br>SSPCM Discrete Status Word [G], check that bits [H] = 00 binary | | |
| 54. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Verify discretes for Sim-1 are both indicating "0" |
| 55. | | | TSS Laptop, "I&ES Sim-2 RS-422" Screen<br>Verify discretes for Sim-2 are both indicating "0" |
| 56. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Set Value:     Analog Output "-5V, Square wave @ 100% (-5V dc)" |
| 57. | | | TSS Laptop, "I&ES Sim-2 RS-422" Screen<br>Set Value:     Analog Output "-5V, Square wave @ 100% (-5V dc)" |
| 58. | Health & Status Check<br>Read and Record SSPCM Input Status Word [I] | | |
| 59. | Health & Status Check<br>Read and Record SSPCM Input Status Word [J] | | |
| 60. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Set Value:     Analog Output "+5V, Square wave @ 100% (+5V dc)" |
| 61. | | | TSS Laptop, "I&ES Sim-2 RS-422" Screen<br>Set Value:     Analog Output "+5V, Square wave @ 100% (+5V dc)" |
| 62. | Health & Status Check<br>Read and Record SSPCM Input Status Word [I] | | |
| 63. | Health & Status Check<br>Read and Record SSPCM Input Status Word [J] | | |
| 64. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Select:          "QUIT" button |
| 65. | | | TSS Laptop, "I&ES Sim-2 RS-422" Screen<br>Select:          "QUIT" button<br><br>**NOTE**:  Swap Ethernet/RS232 cables to appropriate BOB ports. |
| 66. | | | TSS Laptop, "Windows 95" desktop<br>Select:          "Start" menu<br>Select:          "I&ES Simulator (Start).exe"<br>Verify the following is displayed:<br>• " I&ES Configuration" Window Software on the TSS Laptop and configure for Two (2) Simulators as follows |

## TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|------|------|------------|---------|
| 67. | | | TSS Laptop, "I&ES Configuration" Window<br>Select: "Two Simulators"<br><u>BOB-1/Sim-1</u>:<br>Select: Comm Protocol "RS-422"<br>Set Value: Baud rate "2400"<br>Set Value: Function Code "[K]"<br><u>BOB-2/Sim-2</u>:<br>Select: Comm Protocol "TCP/IP"<br>Set Value: TCP/IP Port "6400"<br>Set Value: Function Code "100"<br>Select: "START" button<br>Verify the following screens appear:<br>• "I&ES Sim-1 RS-422"<br>• "I&ES Sim-2 TCP/IP" |
| 68. | | | TSS Laptop, "I&ES Sim-1 RS-422" Screen<br>Verify the following:<br>• HRF Rack Voltage 28± 1V |
| 69. | | | TSS Laptop, "I&ES Sim-2 TCP/IP" Screen<br>Verify the following:<br>• "Connection Established" is indicated<br>• "Transmission Control" LED is green |
| 70. | | | TSS Laptop, "I&ES Sim-2 TCP/IP" Screen<br>Set Value: Select Request "10" (data bytes)<br>Set Value: Repetitions "2"<br>Set Value: Frequency "1"<br>Verify the following request in "I&ES to RIC Request (Outgoing)" field:<br>• 55AA 0018 009C 0100 0001 009C 0000 0000 0000 0001 0002 |
| 71. | | | TSS Laptop, "I&ES Sim-2 TCP/IP" Screen<br>"I&ES to RIC Request (Outgoing)" field:<br>Change the fifth word to value [L]<br>Verify the following request is indicated:<br>• 55AA 0018 009C 0100 [L] 009C 0000 0000 0000 0001 0002 |
| 72. | | | TSS Laptop, "I&ES Sim-2 TCP/IP" Screen<br>Select: "SEND" button<br>Verify the following:<br>• Two (2) messages sent above appear in the "RIC to I&ES Messages (Incoming)" field of Sim-1 (RS-422)<br><br>**NOTE**: An extra RS-422 checksum word is displayed at the end of the original message. |
| 73. | | | TSS Laptop, "I&ES Sim-1 RS-422" Screen<br>Select: "QUIT" button |

TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|------|------|-----------|---------|
| 74. | | | TSS Laptop, "I&ES Sim-2 TCP/IP" Screen<br>Select:          "QUIT" button<br><br>**NOTE**: Swap Ethernet/RS232 cables to appropriate BOB ports. |
| 75. | | | TSS BOB 1, Front Panel<br>Data pwr sw                          - off<br>Verify the Data LED is not illuminated |
| 76. | | | TSS BOB 2, Front Panel<br>Data pwr sw                          - off<br>Verify the Data LED is not illuminated |
| 77. | | HRF Rack, Upper Front Panel<br>Subrack [A] pwr sw               - off<br>Subrack [B] pwr sw               - off<br>Verify the following:<br>• Subrack [A] LED is not illuminated<br>• Subrack [B] LED is not illuminated | |
| 78. | | EXP Laptop, "EXPRESS EPS: Drawer Power" Screen<br>For Locations [A] and [B]<br>Select:     "Off" radio button<br>Select:     "Execute" button<br><br>**NOTE**:  The QA buys for the following steps indicated in Table 6.18 and signed off once performed.  This matrix will serve as the official record for completion of the steps. | |
| 79. | | EXP Laptop, "EXPRESS Comm: Drawer Comm" Screen<br>For all configured Locations<br>Select:          "Inhibit" radio button<br>Select:          "Execute" button | |
| 80. | | EXP Laptop, Front Panel<br>Configure Discretes as inputs for SSPCM (outputs from the payload) for the Deployed Location<br><br>**NOTE**:  The following six (6) steps must be performed in proper order and as a unit to support the Payload A2 Location testing. | |
| 81. | | EXP Laptop, "EXPRESS EPS: Drawer Power" Screen<br>Verify Payload A2 Location power deactivated. | |
| 82. | | | TSS Laptop, "Windows 95" desktop<br>Select:          "Start" menu<br>Select:          "Shutdown"<br>Verify the following:<br>• "Shutdown" window appears |
| 83. | | | TSS Laptop, "Shutdown" Window<br>Select:          "YES" button<br>Verify the following:<br>• Laptop is powered off |
| 84. | | Configure HRF Rack Location J1 for MRDL, Ethernet with Port Number 1900 (hex), Function Code 108 and IP Address 10.12.12.108 | |

# TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|------|------|-----------|---------|
| 85. | | HRF Rack, Front panel<br>Subrack Location J1:<br>Verify BOB-1 installed<br>Subrack Location J2:<br>Verify BOB-2 installed | |
| 86. | | HRF Rack, Upper front panel<br>Subrack J1 pwr sw        - off<br>Subrack J2 pwr sw        - off<br>Verify the following:<br>• Subrack [A] LED is not illuminated<br>• Subrack [B] LED is not illuminated | |
| 87. | | | Disconnect the following hardware:<br>• SAB/BOB Data Interface Cable from BOB-1<br>• SAB/BOB Data Interface Cable from SAB (BOB 1 Connector) |
| 88. | | | Connect the following hardware:<br>• SAB/Front Panel Payload Interface Cable SEG38116524-301 to SAB (BOB-1 Connector)<br>• SAB/Front Panel Payload Interface Cable SEG38116524-301 to HRF Rack Front Panel Payload Data (RCP J2) and Power (RCP J1) |
| 89. | | EXP Laptop, "EXPRESS Comm: Drawer Comm" Screen<br>Locations Payload A2, J1 and J2<br>Select:      "Enable" radio button<br>Select:      "Execute" button | |
| 90. | | EXP Laptop, "EXPRESS EPS: Drawer Power" Screen<br>Location J2<br>Select:      "On" radio button<br>Select:      "Execute" button | |
| 91. | | EXP Laptop, "EXPRESS EPS: Drawer Power" Screen<br>Payload A2 Location<br>Select:      "On" radio button<br>Select:      "Execute" button | |
| 92. | | HRF Rack, Upper Front Panel<br>Payload pwr sw       - on<br>Verify the following:<br>• Payload LED is illuminated green | |
| 93. | | | TSS SAB, Front Panel<br>Verify the following:<br>LED is illuminated green |
| 94. | | HRF Rack, Upper Front Panel<br>Subrack J2 pwr sw     - on<br>Verify the following:<br>• Subrack J2 LED is illuminated green | |
| 95. | | | TSS BOB-2, Front Panel<br>Data sw           - on<br>Verify the following:<br>Data LED is illuminated red |
| 96. | | | TSS Laptop, Left side panel<br>Main pwr sw       - on |
| 97. | | | TSS Laptop, "Windows 95" desktop<br>Select:      "Start" menu<br>Select:      "I&ES Simulator (Start).exe"<br>Verify the following is displayed:<br>• " I&ES Configuration" Window |

TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|------|------|-----------|---------|
| 98. | | | TSS Laptop, "I&ES Configuration" Window<br>Select:          "Two Simulators"<br><u>BOB-1/Sim-1</u>:<br>Select:          Comm Protocol "TCP/IP"<br>Set Value:     TCP/IP Port "6400"<br>Set Value:     Function Code "100"<br><u>BOB-2/Sim-2</u>:<br>Select:          Comm Protocol "RS-422"<br>Set Value:     Baud rate "2400"<br>Set Value:     Function Code "115"<br>Select:          "START" button<br>Verify the following screens appear:<br>• "I&ES Sim-1 TCP/IP"<br>• "I&ES Sim-2 RS-422" |
| 99. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Verify the following:<br>• HRF Rack Voltage 28± 1V<br>• "Connection Established" is indicated<br>• "Transmission Control" LED is green |
| 100. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Set Value:          Select Request "10" (data bytes)<br>Set Value:     Repetitions "2"<br>Set Value:     Frequency "1"<br>Verify the following request in "I&ES to RIC Request (Outgoing)" field:<br>• 55AA  0018  009C  0100  0001  009C  0000  0000  0000  0001  0002 |
| 101. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>"I&ES to RIC Request (Outgoing)" field:<br>Change the fifth word to value '0115'<br>Verify the following request is indicated:<br>• 55AA  0018  009C  0100  0115  009C  0000  0000  0000  0001  0002 |
| 102. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Select:          "SEND" button<br>Verify the following:<br>• Two (2) messages sent above appear in the "RIC to I&ES Messages (Incoming)" field of Sim-2 (RS-422)<br><br>**NOTE**: An extra RS-422 checksum word is displayed at the end of the original message. |
| 103. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Discrete 1 & 2 Assignment "Write/Write"<br>Select:          "OK" button |

## TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|------|------|-----------|---------|
| 104. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Set Value:    output discretes (2 each) "High" (1) |
| 105. | Health & Status Check<br>Verify the following:<br>• SSPCM Discrete Status Word 19, check that bits 2, 1 = 11 binary | | |
| 106. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Set Value:    output discretes (2 each) "Low" (0) |
| 107. | Health & Status Check<br>Verify the following:<br>• SSPCM Discrete Status Word 19, check that bits 2, 1 = 00 binary | | |
| 108. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Discrete 1 & 2 Assignment "Read/Read"<br>Select:    "OK" button |
| 109. | | EXP Laptop, "EXPRESS-EPS: Drawer Power" Screen<br>For Payload A2 Location<br>Select:    "Off" radio button<br>Select:    "Execute" button | |
| 110. | | EXP Laptop, "EXPRESS-Comm: Drawer Comm" Screen<br>For Payload A2 Location<br>Select:    "Inhibit" radio button<br>Select:    "Execute" button | |
| 111. | | EXP Laptop, Front Panel<br>Configure Discretes as outputs from SSPCM (inputs to the payload) for the Payload A2 Payload Location | |
| 112. | | EXP Laptop, "EXPRESS-EPS: Drawer Power" Screen<br>For Payload A2 Location<br>Select:    "On" radio button<br>Select:    "Execute" button | |
| 113. | | EXP Laptop, "EXPRESS-Comm: Drawer Comm" Screen<br>For Payload A2 Location<br>Select:    "Enable" radio button<br>Select:    "Execute" button | |
| 114. | | EXP Laptop, Front Panel<br>Set both of the HRF Rack SSPCM discrete outputs for the Payload A2 Location to "High" (1) | |
| 115. | Health & Status Check<br>SSPCM Discrete Status Word 19, check that bits 2, 1 = 11 binary | | |
| 116. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Verify the following:<br>• Discretes for Simulator 1 are both indicating "1" |
| 117. | | EXP Laptop, Front Panel<br>Set both of the HRF Rack SSPCM discrete outputs for the Payload A2 Location to "Low" (0) | |
| 118. | Health & Status Check<br>SSPCM Discrete Status Word 19, check that bits 2, 1 = 00 binary | | |

TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|------|------|------------|---------|
| 119. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Discretes for Simulator 1 are both indicating "0" |
| 120. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Set Value:     Analog Output "-5V, Square wave @ 100% (-5V dc)" |
| 121. | Health & Status Check<br>Record the value of the SSPCM Input Status Word 40 in the Table 6.18 | | |
| 122. | | | TSS Laptop, "I&ES Sim-1 TCP/IP" Screen<br>Set Value:     Analog Output "+5V, Square wave @ 100% (+5V dc)" |
| 123. | Health & Status Check<br>Record the value of the SSPCM Input Status Word 40 in the Table 6.18 | | |
| 124. | | | TSS Laptop, "I&ES Sim-1 TCP/IP Screen<br>Select:          "QUIT" button |
| 125. | | | TSS Laptop, "I&ES Sim-2 RS-422" Screen<br>Select:          "QUIT" button |
| 126. | | | TSS Laptop, "Windows 95" desktop<br>Select:          "Start" menu<br>Select:          "Settings"<br>Select:          "Control Panels"<br>Verify the following:<br>• "Control Panel" window appears |
| 127. | | | TSS Laptop, "Control Panel" Window<br>Select:          "Network"<br>Verify the following:<br>• "Network" window appears |
| 128. | | | TSS Laptop, "Network" Window<br>Select:          "TCP/IP -> 3 COM..."<br>Verify the following:<br>• "TCP/IP Properties" window appears |
| 129. | | | TSS Laptop, "TCP/IP Properties" Window<br>IP Address:<br>Set Value:       "10.12.12.108"<br>Select:          "OK" button |
| 130. | | | TSS Laptop, "Network" Window<br>Select:          "OK" button |
| 131. | | | TSS Laptop, "Windows 95" desktop<br>Select:          "Start" menu<br>Select:          "Shutdown"<br>Verify the following:<br>• "Shutdown" window appears |
| 132. | | | TSS Laptop, "Shutdown" Window<br>Select:             "YES" button<br>Verify the following:<br>• TSS Laptop powers off |
| 133. | | HRF Rack, Upper Front Panel<br>Payload pwr sw                - off<br>Verify the following:<br>• Payload LED is not illuminated | |
| 134. | | | TSS SAB, Front Panel<br>Verify the following:<br>LED is not illuminated |

# TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|------|------|-----------|---------|
| 135. | | EXP Laptop, "EXPRESS EPS: Drawer Power" Screen<br>Payload A2 Location<br>Select:     "Off" radio button<br>Select:     "Execute" button | |
| 136. | | EXP Laptop, "EXPRESS Comm: Drawer Comm" Screen<br>Payload A2 Location<br>Select:     "Inhibit" radio button<br>Select:     "Execute" button | |
| 137. | | EXP Laptop, "EXPRESS Comm: P/L Control" Screen<br>Configure the Payload A2 Location for MRDL, RS-422 with Baud Rate 2400 and Function Code 100 | |
| 138. | | EXP Laptop, "EXPRESS EPS: Drawer Power" Screen<br>Payload A2 Location<br>Select:     "On" radio button<br>Select:     "Execute" button | |
| 139. | | EXP Laptop, "EXPRESS Comm: Drawer Comm" Screen<br>Payload A2 Location<br>Select:     "Enable" radio button<br>Select:     "Execute" button | |
| 140. | | HRF Rack, Upper Front Panel<br>Payload pwr sw     - on<br>Verify the following:<br>• Payload LED is illuminated green | |
| 141. | | | TSS SAB, Front Panel<br>Verify the following:<br>• Power LED is illuminated green |
| 142. | | | TSS Laptop, Left side panel<br>Main pwr sw     - on |
| 143. | | | TSS Laptop, "Windows 95" desktop<br>Select:     "Start" menu<br>Select:     "I&ES Simulator (Start).exe"<br>Verify the following is displayed:<br>• " I&ES Configuration" Window |
| 144. | | | TSS Laptop, "I&ES Configuration" Window<br>Select:     "Two Simulators"<br><u>BOB-1/Sim-1</u>:<br>Select:     Comm Protocol "RS-422"<br>Set Value:     Baud rate "2400"<br>Set Value:     Function Code "100"<br><u>BOB-2/Sim-2</u>:<br>Select:     Comm Protocol "TCP/IP"<br>Set Value:     TCP/IP Port "6400"<br>Set Value:     Function Code "108"<br>Select:     "START" button<br>Verify the following Screens appear:<br>• "I&ES Sim-1 RS-422"<br>• "I&ES Sim-2 TCP/IP" |
| 145. | | | TSS Laptop, "I&ES Sim-1 RS-422" Screen<br>Verify the following:<br>• HRF Rack Voltage 28± 1V |
| 146. | | | TSS Laptop, "I&ES Sim-2 TCP/IP" Screen<br>Verify the following:<br>• "Connection Established" is indicated<br>• "Transmission Control" LED is green |

TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|---|---|---|---|
| 147. | | | TSS Laptop, "I&ES Sim-2 TCP/IP" Screen<br>Set Value:    Select Request "10" (data bytes)<br>Set Value:    Repetitions "2"<br>Set Value:    Frequency "1"<br>Verify the following request in "I&ES to RIC Request (Outgoing)" field:<br>• 55AA  0018  009C  0108  0001  009C  0000  0000  0000  0001  0002 |
| 148. | | | TSS Laptop, "I&ES Sim-2 TCP/IP" Screen<br>"I&ES to RIC Request (Outgoing)" field:<br>Change the fifth word to value '0100'<br>Verify the following request is indicated:<br>• 55AA  0018  009C  0108 0100  009C  0000  0000  0000  0001  0002 |
| 149. | | | TSS Laptop, "I&ES Sim-2 TCP/IP" Screen<br>Select:    "SEND" button<br>Verify the following:<br>• Two (2) messages sent above appear in the "RIC to I&ES Messages (Incoming)" field of Sim-1 (RS-422)<br><br>**NOTE**:  An extra RS-422 checksum word is displayed at the end of the original message. |
| 150. | | | TSS Laptop, "I&ES Sim-1 RS-422" Screen<br>Select:    "QUIT" button |
| 151. | | | TSS Laptop, "I&ES Sim-2 TCP/IP" Screen<br>Select:    "QUIT" button |
| 152. | | | TSS BOB-2, front panel<br>Data sw    - off<br>Verify the following:<br>• Data LED is not illuminated |
| 153. | | HRF Rack, Upper Front Panel<br>Payload pwr sw    - off<br>Subrack J2 pwr sw    - off<br>Verify the following:<br>• Subrack J1 LED is not illuminated<br>• Subrack J2 LED is not illuminated<br>Verify Pwr SAB LED    - off | |
| 154. | | | TSS SAB, Front panel<br>Verify the following:<br>• Pwr LED is not illuminated |
| 155. | | EXP Laptop, "EXPRESS EPS: Drawer Power" Screen<br>For Location J2, and Payload A2<br>Select:    "Off" radio button<br>Select:    "Execute" button | |

## TABLE 6.16  SIR/BOB (CONT'D)

| Step | PRCU | HRF Rack 1 | Payload |
|------|------|------------|---------|
| 157. | | | TSS Laptop, "Windows 95" desktop<br>Select:　　　"START" menu<br>Select:　　　"Shutdown"<br>Verify the following:<br>• "Shutdown" window appears |
| 158. | | | TSS Laptop, "Shutdown" Window<br>Select:　　　"YES" button |
| 159. | | HRF Rack, Front Panel<br>Subrack Location J1:<br>Remove BOB-1<br><br>**NOTE**:  When sliding drawer out of Subrack location, be sure to lift safety stop on the left side of the payload drawer. | |
| 160. | | HRF Rack, Front Panel<br>Subrack Location J2:<br>Remove BOB-2<br><br>**NOTE**:  When sliding drawer out of Subrack location, be sure to lift safety stop on the left side of the payload drawer. | |
| 161. | | | Disconnect the following hardware:<br>• SAB/Front Panel Payload Interface Cable SEG38116524-301 to SAB (BOB-1)<br>• SAB/Front Panel Payload Interface Cable SEG38116524-301 to HRF Rack Front Panel Payload Data (RCP J2) and Power  (RCP J1) |
| 162. | | | Disconnect the following hardware:<br>• TSS Assy |
| 163. | | Perform HRF Rack Deactivation per LS-71139-5 Section 6.0 | |
| 164. | Perform PRCU shutdown per LS-71139-2 Section 6.0 | | |

# TABLE 6.17  ITERATION GUIDE FOR SIR/BOB VALUES

| Iteration | [A] | [B] | [C] | [D] | [E] | [F] | [G] | [H] | [I] | [J] | [K] | [L] |
|-----------|-----|-----|-----|------|--------|----------|--------|----------|-----|-----|-----|------|
| 1. | B1 | C2 | 109 | 0109 | 16 | (1, 0) | 17 | (9, 8) | 25 | 41 | 101 | 0101 |
| 2. | C1 | C2 | 109 | 0109 | 16 | (4, 3) | 17 | (9, 8) | 26 | 41 | 102 | 0102 |
| 3. | D1 | D2 | 110 | 0110 | 16 | (7, 6) | 18, 17 | (0, 11) | 29 | 42 | 103 | 0103 |
| 4. | E1 | E2 | 111 | 0111 | 16 | (10, 9) | 18 | (3, 2) | 31 | 43 | 104 | 0104 |
| 5. | F1 | F2 | 112 | 0112 | 16 | (13, 12) | 18 | (6, 5) | 33 | 44 | 105 | 0105 |
| 6. | G1 | G2 | 113 | 0113 | 17, 16 | (0, 15) | 18 | (9, 8) | 35 | 45 | 106 | 0106 |
| 7. | H1 | H2 | 114 | 0114 | 17 | (3, 2) | 18 | (12, 11) | 37 | 46 | 107 | 0107 |
| 8. | J1 | J2 | 115 | 0115 | 17 | (6, 5) | 18 | (15, 14) | 39 | 47 | 108 | 0108 |

Key for Table Elements:
BOB-1 is associated with [A] [E] [F] [I] [K] [L]
BOB-2 is associated with [B] [C] [D] [G] [H] [J]
[A] [B] – Rack Drawer Locations
[C] [K] – Function Code Assignments
[D] [L] – Destination Function Codes
[E] [F] [G] [H] – H&S Discrete Status Words and bits per Drawer Location
[I] [J] – H&S (Analog) Input Status Words

## TABLE 6.18  QUALITY BUY-OFF MATRIX FOR MIPS

| | Steps: | 15. | 18. | 19. | 26. | 31. | 32. | 35. | 36. | 48. | 49. | 54. | 55. | 58. | 59. | 62. | 63. | 72. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Iteration 1** | T | | | | | | | | | | | | | | | | | |
| | QA | | | | | | | | | | | | | | | | | |
| | Steps: | 15. | 18. | 19. | 26. | 31. | 32. | 35. | 36. | 48. | 49. | 54. | 55. | 58. | 59. | 62. | 63. | 72. |
| **Iteration 2** | T | | | | | | | | | | | | | | | | | |
| | QA | | | | | | | | | | | | | | | | | |
| | Steps: | 15. | 18. | 19. | 26. | 31. | 32. | 35. | 36. | 48. | 49. | 54. | 55. | 58. | 59. | 62. | 63. | 72. |
| **Iteration 3** | T | | | | | | | | | | | | | | | | | |
| | QA | | | | | | | | | | | | | | | | | |
| | Steps: | 15. | 18. | 19. | 26. | 31. | 32. | 35. | 36. | 48. | 49. | 54. | 55. | 58. | 59. | 62. | 63. | 72. |
| **Iteration 4** | T | | | | | | | | | | | | | | | | | |
| | QA | | | | | | | | | | | | | | | | | |
| | Steps: | 15. | 18. | 19. | 26. | 31. | 32. | 35. | 36. | 48. | 49. | 54. | 55. | 58. | 59. | 62. | 63. | 72. |
| **Iteration 5** | T | | | | | | | | | | | | | | | | | |
| | QA | | | | | | | | | | | | | | | | | |

TABLE 6.18  QUALITY BUY-OFF MATRIX FOR MIPS (CONT'D)

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Iteration 6** | Steps: | 15. | 18. | 19. | 26. | 31. | 32. | 35. | 36. | 48. | 49. | 54. | 55. | 58. | 59. | 62. | 63. | 72. |
| | Tech. | | | | | | | | | | | | | | | | | |
| | Quality | | | | | | | | | | | | | | | | | |
| **Iteration 7** | Steps: | 15. | 18. | 19. | 26. | 31. | 32. | 35. | 36. | 48. | 49. | 54. | 55. | 58. | 59. | 62. | 63. | 72. |
| | Tech. | | | | | | | | | | | | | | | | | |
| | Quality | | | | | | | | | | | | | | | | | |
| **Iteration 8** | Steps: | 15. | 18. | 19. | 26. | 31. | 32. | 35. | 36. | 48. | 49. | 54. | 55. | 58. | 59. | 62. | 63. | 72. |
| | Tech. | | | | | | | | | | | | | | | | | |
| | Quality | | | | | | | | | | | | | | | | | |
| **Deployed** | Steps: | 86. | 88. | 93. | 102. | 105. | 107. | 116. | 119. | 121. | 123. | 149. | | | | | | |
| | Tech. | | | | | | | | | | | | | | | | | |
| | Quality | | | | | | | | | | | | | | | | | |

6.3        OFFLINE PAYLOAD FUNCTIONALS

6.3.1       <u>Gas Analyzer System for Metabolic Analysis of Physiology (GASMAP)</u>

6.3.1.1      GASMAP Analyzer Module Functional

This sequence describes the functional procedure performed on the HRF GASMAP units.  This procedure is performed with the following assumptions:

- The analyzer has been calibrated
- The functionality of the GASMAP payload including the following subsystems:
- Analyzer Roughing
- System Power
- Front Panel Controls
- Identification
- Environmental Sensor
- Flow Meter
- Room Air Measurement
- Gas Delivery System

The following list provides the flight units or equivalent hardware that may be used to perform off line functional tests.  The part numbers and serial numbers will be noted on the TPS.

TABLE 6.19  GASMAP ANALYZER MODULE HARDWARE

| Qty | Item | Class |
|---|---|---|
| 1 | Analyzer Module | Flight |
| 1 | Catheter | Flight |
| 1 | Flowmeter Cable | Flight |
| 1 | Flow Cartridge | Flight |
| 1 | Aux Power Cable | GSE |

Once the GASMAP payload has successfully completed functional testing, it can be integrated into the HRF Rack.

# TABLE 6.20  GASMAP FUNCTIONAL CHECKOUT

| Step | Payload | Tech |
|---|---|---|
| 1. | Remove the following hardware from Building 241 Controlled Storage:<br><br>Qty      Item<br>1         GASMAP Analyzer Module<br>1         Catheter<br>1         Flowmeter Cable<br>1         Flow Cartridge<br>1         AUX Power Cable<br>1         Variable Power Supply<br>1         Digital Multimeter | |
| 2. | Assemble the hardware from above Figure 1 in Appendix B | |
| 3. | GASMAP Analyzer Module, Front Panel<br>Verify the following:<br>• "HRF GASMAP MAIN/AUX" sw    - AUX<br>• "Main Power" sw    - off<br>• "AUX Power" sw    - off | |
| 4. | | Variable Power Supply<br>Verify the following:<br>Main pwr sw    - off<br><br>Record the following information:<br>  Model: _____<br>  NASA Tag #: _____<br>  Calibration #: _____<br>  Calibration Date: _____ |
| 5. | | Connect the following hardware:<br>• AUX Power Cable (GSE)  to Variable Power Supply<br>• Variable Power Supply to Power Source |
| 6. | | Variable Power Supply, front panel<br>Main pwr sw    - on<br>Set Value:    28 V<br>Set Value:    25 amps<br><br>**NOTE**:  If using a calibrated power supply, continue on to the following step.<br><br>Using Digital Multimeter:<br>• Verify the voltage between pins 1 and 2 measures 28 $\pm$ 0.5 V dc<br>Record the following information:<br>  Model: _____<br>  NASA Tag #: _____<br>  Calibration #: _____<br>  Calibration Date: _____ |
| 7. | | Variable Power Supply<br>Main pwr sw    - off |
| 8. | Connect the following hardware:<br>• AUX Power Cable (GSE) to GASMAP Analyzer Module | |
| 9. | | Variable Power Supply, front panel<br>Main Power sw    - on<br>Set Value:    28 V<br>Set Value:    25 amps |

# TABLE 6.20  GASMAP FUNCTIONAL CHECKOUT (CONT'D)

| Step | Payload | Tech |
|---|---|---|
| 10. | GASMAP Analyzer Module, Front Panel<br>"HRF GASMAP MAIN/AUX" sw                              - AUX<br>"HRF GASMAP" sw                                              - on<br><br>**NOTE**:  The front panel display may take up to one (1) minute to activate.  The GASMAP goes through a pressure check to determine if the analyzer has maintained vacuum. This process can take anywhere from ten (10) seconds to thirty (30) minutes depending upon the state of the payload. When this process is complete, continue with the rest of the sequence.<br><br>Verify the following appears:<br>• "Main Menu" Screen<br>• Error LED is not illuminated<br>• "POWER" LED is illuminated<br>• HRF GASMAP cooling fan is operational<br>• Air is blowing from the rear panel of the payload<br><br>**NOTE**:  If the Error LED is illuminated, perform sequence 6.3.1.3 in its entirety. | |
| 11. | GASMAP Analyzer Module, Front Panel<br>Verify the following appears:<br>• "Main Menu" Screen<br>• Error LED is not illuminated | |
| 12. | GASMAP Analyzer Module, "Main Menu" Screen<br>Select:      "Diag" <3><br>Select:      "Display" <1><br>Select:      "Devices" <3><br>Select:      "Ion Pump" <1><br>Verify the following appears:<br>• "Ion Pump" Screen | |
| 13. | GASMAP Analyzer Module, "Ion Pump" Screen<br>Record the following measurements:<br>IPC = _____ µA (< 20 µA)<br>IPV = _____ V (4500 – 6300 V) | |
| 14. | GASMAP Analyzer Module, Front Panel<br>Select:    <MAIN MENU><br>Verify the following appears:<br>• "Main Menu" Screen | |
| 15. | GASMAP Analyzer Module, "Main Menu" Screen<br>Select:    "Diag" <3><br>Select:    "Test" <3><br>Select:    "LCD" <2><br>Verify the following:<br>• All LCD segments are functional | |
| 16. | GASMAP Analyzer Module, "LCD Test" Screen<br>Select:    <MAIN MENU><br>Verify the following appears:<br>• "Main Menu" Screen | |

## TABLE 6.20  GASMAP FUNCTIONAL CHECKOUT (CONT'D)

| Step | Payload | Tech |
|------|---------|------|
| 17. | GASMAP Analyzer Module, "Main Menu" Screen<br>Select:    "Diag" <3><br>Select:    "Test" <3><br>Select:    "Lamp" <4><br>Verify the following appears:<br>• "Diagnostic Test" Screen | |
| 18. | GASMAP Analyzer Module, "Lamp Test" Screen<br>Select:    <1><br>Select:    <2><br>Verify the following:<br>• "ERROR" LED is on<br>• "CHECK LCD" LED is on | |
| 19. | GASMAP Analyzer Module, "Lamp Test" Screen<br>Select:    <1><br>Select:    <2><br>Verify the following:<br>• "ERROR" LED is off<br>• "CHECK LCD" LED is off | |
| 20. | GASMAP Analyzer Module, "Main Menu" Screen<br>Select:    "Diag" <3><br>Select:    "Test" <3><br>Select:    "Keypad" <1><br>Verify the following is displayed:<br>• "Key Pad Test" Screen | |
| 21. | GASMAP Analyzer Module, "Key Pad Test" Screen<br>Select each key three (3) times, except <ESC><br>Verify the following:<br>• All keys are functional | |
| 22. | GASMAP Analyzer Module, "Key Pad Test" Screen<br>Select:    <ESC><br>Select:    <MAIN MENU><br>Verify the following appears:<br>• "Main Menu" Screen | |
| 23. | GASMAP Analyzer Module, "Main Menu" Screen<br>Select:    "Diag" <3><br>Select:    "Display" <1><br>Select:    "System" <1><br>Select:    "About" <1><br>Verify the following appears:<br>• "About HRF GASMAP" Screen | |
| 24. | GASMAP Analyzer Module, "About HRF" Screen<br>Record the following information:<br>HRF GASMAP S/N: _____<br>HRF GASMAP Information System (IS) S/W Version:<br><br>_____<br>HRF GASMAP RAMS S/W Version: _____<br>HRF GASMAP Ethernet Address: _____<br>HRF GASMAP IP Address: _____<br><br>Select:    <MAIN MENU><br>Verify the following appears:<br>• "Main Menu" Screen | |
| 25. | GASMAP Analyzer Module, "Main Menu" Screen<br>Select:    "Diag" <3><br>Select:    "Display" <1><br>Select:    "Devices" <3><br>Select:    <↓><br>Select:    "Environment" <2><br>Verify the following appears:<br>• "Environment" Screen | |

## TABLE 6.20  GASMAP FUNCTIONAL CHECKOUT (CONT'D)

| Step | Payload | Tech |
|---|---|---|
| 26. | GASMAP Analyzer Module, "Environment" Screen<br>Record the following information:<br>• Cabin Temperature: _____ º C<br>• Barometric Pressure:_____ mmHg | |
| 27. | | Record the following information:<br>• Ambient Temperature:  _____ºC<br>• Barometric Pressure:  _____ mmHg |
| 28. | GASMAP Analyzer Module, Cabin Temperature Sensor<br>Place finger on sensor for 10-20 seconds<br>Verify the following:<br>• Sensor temperature increases | |
| 29. | GASMAP Analyzer Module, Cabin Temperature Sensor<br>Remove finger from sensor<br>Verify the following:<br>• Sensor temperature decreases<br>Select:    <MAIN MENU><br>Verify the following appears:<br>• "Main Menu" Screen | |
| 30. | Connect the following hardware:<br>• Turbine flow meter (GSE) to GASMAP Analyzer Module, J6 | |
| 31. | GASMAP Analyzer Module, "Main Menu" Screen<br>Select:    "Diag" <3><br>Select:    "Test" <3><br>Select:    "VMM" <3><br>Verify the following appears:<br>• "VMM Test" Screen | |
| 32. | GASMAP Analyzer Module, "VMM Test" Screen<br>Breathe into the flow meter:<br>• Perform two (2) slow inhales<br>Verify the following:<br>Front panel inhale value increases during inhales | |
| 33. | GASMAP Analyzer Module, "VMM Test" Screen<br>Breathe into the flow meter:<br>• Perform two (2) slow exhales<br>Verify the following:<br>Front panel exhale value increases during exhales | |
| 34. | GASMAP Analyzer Module, "VMM Test" Screen<br>Select:    <MAIN MENU><br>Verify the following is displayed:<br>• "Main Menu" Screen | |
| 35. | GASMAP Analyzer Module, "Main Menu" Screen<br>Select:    "Diag" <3><br>Select:    "Setup" <2><br>Select:    "Sam Drw" <5><br>Verify the following appears:<br>• "Sample Draw" Screen | |
| 36. | GASMAP Analyzer Module, "Sample Draw" Screen<br>Select:    "Cath Pump" <1><br>Select:    <ENTER><br>Verify the following appears:<br>• "Diag Setup" Screen | |
| 37. | GASMAP Analyzer Module, Diag Setup" Screen<br>Select:    <MAIN MENU><br>Verify the following appears:<br>• "Main Menu" Screen | |
| 38. | GASMAP Analyzer Module, "Main Menu" Screen<br>Select:    "Operate" <4><br>Select:    "Default1" <1><br>Verify the following appears:<br>• "Atmospheric Information" Screen<br><br>**NOTE**:  Wait thirty (30) seconds before proceeding. | |

## TABLE 6.20  GASMAP FUNCTIONAL CHECKOUT (CONT'D)

| Step | Payload | Tech |
|---|---|---|
| 39. | GASMAP Analyzer Module, "Atmospheric Information" Screen<br>Record the following information:<br><u>Gas</u>    <u>Room Air</u>    <u>Measured</u>    <u>Limits</u><br>$N_2$    78.08%    _____    77.08<X<79.08%<br>$O_2$    20.93%    _____    19.93<X<21.93%<br>$CO_2$    0.05%    _____    0<X<0.25%<br>Ar    0.94%    _____    0.64<X<1.24% | |
| 40. | GASMAP Analyzer Module, "Atmospheric Information" Screen<br>Select:   <MAIN MENU><br>Verify the following appears:<br>• "Main Menu" Screen | |
| 41. | GASMAP Analyzer Module, "Main Menu" Screen<br>Select:   "Diag" <3><br>Select:   "Display" <1><br>Select:   "Devices" <3><br>Select:   "CathPmp" <2><br>Verify the following appears:<br>• "Catheter Pump" Screen | |
| 42. | GASMAP Analyzer Module, "Catheter Pump" Screen<br>Record the following information:<br>• Catheter Flow: _____ ml/min (60 $\pm$ 5 ml/min)<br>• Place finger over end of catheter to block flow<br>Record the following information:<br>• Catheter Flow: _____ ml/min ($\leq$ 10 ml/min)<br>Verify the following:<br>• "ERROR" LED is on | |
| 43. | GASMAP Analyzer Module, "Catheter Pump" Screen<br>Select:   <MAIN MENU><br>Verify the following appears:<br>• "Main Menu" Screen | |
| 44. | GASMAP Analyzer Module, "Main Menu" Screen<br>Perform Section 6.3.1.3 to clear "ERROR" LED<br><br>**NOTE:** Allow GASMAP to run for at least one (1) hour before powering down unit.<br><br>Record the following values prior to deactivation:<br>IPC: _____ $\mu$A<br>IPV: _____ V | |
| 45. | GASMAP Analyzer Module, Front Panel<br>"Main Power" sw                        - off<br>"HRF GASMAP MAIN/AUX" sw        - MAIN | |
| 46. | | Variable Power Supply<br>Main pwr sw                  - off |
| 47. | | Disconnect the following hardware:<br>• Variable Power Supply from Power Source<br>• AUX Power Cable (GSE) from GASMAP Analyzer Module (J8)<br>• AUX Power Cable (GSE) from Variable Power Supply |
| 48. | Disassemble All GASMAP hardware<br>Return the following hardware to Building 241 Controlled Storage:<br><br><u>Qty</u>    <u>Item</u><br>1      GASMAP Analyzer Module<br>1      Catheter<br>1      Flowmeter Cable<br>1      Flow Cartridge<br>1      AUX Power Cable<br>1      Digital Multimeter | |

### 6.3.1.2    GASMAP Calibration Module Functional

This section describes the procedures for the functional test of the GASMAP Calibration Module.  The following table describes the flight units or equivalent hardware that may be used to perform off-line functional tests.

TABLE 6.21  GASMAP CALIBRATION MODULE HARDWARE

| Qty | Item | Class |
|---|---|---|
| 1 | GASMAP Calibration Module | Flight |

The objective of this test is to assess the functionality of the GASMAP Calibration Module after integration into the HRF Rack.

TABLE 6.22  GASMAP CALIBRATION FUNCTIONAL

| Step | Payload | Tech |
|---|---|---|
| 1. | Remove the following hardware from Building 241 Controlled Storage:<br><br>Qty    Item<br>1    GASMAP Calibration Module<br>1    Catheter<br>1    GSE Calibration Solenoid Test Box<br>1    External Low Pressure Gauge<br>1    Power Cable<br>1    Variable Power Supply<br>1    Digital Multimeter | |
| 2. | GASMAP Calibration Module, Front Panel<br>Verify the following:<br>• Valve 1                                    - closed<br>• Valve 2                                    - closed<br>• Valve 3                                    - closed | |
| 3. | | GSE Calibration Solenoid Test Box<br>Verify the following:<br>• SW1                                    - off<br>• SW2                                    - off<br>• SW3                                    - off<br>• SW4                                    - off |
| 4. | | Variable Power Supply<br>Verify the following:<br>Main pwr sw                                    - off<br><br>Record the following information:<br>  Model: _____<br>  NASA Tag #: _____<br>  Calibration #: _____<br>  Calibration Date: _____ |
| 5 | | Connect the following hardware:<br>• Power Cable (GSE) to Variable Power Supply<br>• Variable Power Supply to Power Source |

# TABLE 6.22  GASMAP CALIBRATION FUNCTIONAL (CONT'D)

| Step | Payload | Tech |
|------|---------|------|
| 6. | | Variable Power Supply, front panel<br>Main Power sw                                      - on<br>Set Value:       12 V<br>Set Value:        2 amps<br><br>**NOTE**:  If using a calibrated power supply, continue on with the following step.<br><br>Using Digital Multimeter:<br>• Verify the voltage between pins 1 and 2 measures 12 $\pm$ 0.5 V dc<br><br>Record the following information:<br>   Model: _____<br>   NASA Tag #: _____<br>   Calibration #: _____<br>   Calibration Date: _____ |
| 7. | | Variable Power Supply<br>Main pwr sw                                       - off |
| 8. | | Connect the following hardware:<br>GSE Calibration Solenoid Test Box to Variable Power Supply |
| 9. | GASMAP Calibration Module, Front Panel<br>Connect the following:<br>• GSE Calibration Solenoid Test Box, P1 to GASMAP Calibration Module, J1 (SOL POWER) | |
| 10. | | Variable Power Supply, front panel<br>Main Power sw                                    - on<br>Set Value:                                      12 V<br>Set Value:                                       2 amps |
| 11. | GASMAP Calibration Module, Front Panel<br>Connect the following:<br>• GASMAP Calibration Module (sample output) to Catheter | |
| 12. | GASMAP Calibration Module, Front Panel<br>• Valve 1                                      - open<br>• Valve 2                                      - open<br>• Valve 3                                      - open<br><br>**NOTE**:  Valves can be opened by rotating knobs in a direction clockwise one (1) to three (3) times. | |
| 13. | GASMAP Calibration Module, Front Panel<br>Verify/Record the following information:<br>Tank 1 pressure: _____ psi (400 $\leq$ P $\leq$ 1450)<br>Tank 2 pressure: _____ psi (400 $\leq$ P $\leq$ 1450)<br>Tank 3 pressure: _____ psi (400 $\leq$ P $\leq$ 1450) | |
| 14. | | GSE Calibration Solenoid Test Box<br>• SW1                                      - on<br>• SW2                                      - off<br>• SW3                                      - off<br>• SW4                                      - off<br>Verify the following:<br>SOL1 LED is illuminated<br>Audible click can be heard<br><br>**NOTE**:  Allow fifteen (15) seconds for the pressure to stabilize before continuing with the following step. |
| 15. | External Low Pressure Gauge, Front Panel<br>Record the following information:<br>• Tank 1 pressure: _____ psi (6 $\leq$ P $\leq$ 9) | |

TABLE 6.22  GASMAP CALIBRATION FUNCTIONAL (CONT'D)

| Step | Payload | Tech |
|------|---------|------|
| 16. | | GSE Calibration Solenoid Test Box<br>• SW1  - off<br>• SW2  - off<br>• SW3  - off<br>• SW4  - off |
| 17. | GASMAP Calibration Module, Front Panel<br>Disconnect the following:<br>• GASMAP Calibration Module (sample output) from Catheter<br><br>**NOTE**:  The catheter is disconnected to relieve pressure on the unit. | |
| 18. | GASMAP Calibration Module, Front Panel<br>Connect the following:<br>• GASMAP Calibration Module (sample output) to Catheter | |
| 19. | External Low Pressure Gauge, Front Panel<br>Verify the following:<br>• Gauge reading is < 1 psi | |
| 20. | | GSE Calibration Solenoid Test Box<br>• SW1  - off<br>• SW2  - on<br>• SW3  - off<br>• SW4  - off<br><br>Verify the following:<br>• SOL2 LED is illuminated<br>• Audible click can be heard<br><br>**NOTE**:  Allow fifteen (15) seconds for the pressure to stabilize before continuing with the following step. |
| 21. | External Low Pressure Gauge, Front Panel<br>Record the following information:<br>• Tank 2 pressure: _____ psi (6 ≤ P ≤10) | |
| 22. | | GSE Calibration Solenoid Test Box<br>• SW1  - off<br>• SW2  - off<br>• SW3  - off<br>• SW4  - off |
| 23. | GASMAP Calibration Module, Front Panel<br>Disconnect the following:<br>• GASMAP Calibration Module (sample output) from Catheter<br><br>**NOTE**:  The catheter is disconnected in order to relieve pressure on the unit.  When the pressure has been relieved, continue on with the following step. | |
| 24. | GASMAP Calibration Module, Front Panel<br>Connect the following:<br>• GASMAP Calibration Module (sample output) to Catheter | |
| 25. | External Low Pressure Gauge, Front Panel<br>Verify the following:<br>• Gauge reading is < 1 psi | |

# TABLE 6.22  GASMAP CALIBRATION FUNCTIONAL (CONT'D)

| Step | Payload | Tech |
|------|---------|------|
| 26. | | GSE Calibration Solenoid Test Box<br>• SW1   - off<br>• SW2   - off<br>• SW3   - on<br>• SW4   - off<br>Verify the following:<br>• SOL3 LED is illuminated<br>• Audible click can be heard<br><br>**NOTE**: Allow fifteen (15) seconds for the pressure to stabilize before continuing with the following step. |
| 27. | External Low Pressure Gauge, Front Panel<br>Record the following information:<br>• Tank 3 pressure: _____ psi (6 $\leq$ P $\leq$ 9) | |
| 28. | | GSE Calibration Solenoid Test Box<br>• SW1   - off<br>• SW2   - off<br>• SW3   - off<br>• SW4   - off |
| 29. | GASMAP Calibration Module, Front Panel<br>Disconnect the following:<br>• GASMAP Calibration Module (sample output) from Catheter<br><br>**NOTE**: The catheter is disconnected to relieve pressure on the unit. | |
| 30. | GASMAP Calibration Module, Front Panel<br>Connect the following:<br>• GASMAP Calibration Module (sample output) to Catheter | |
| 31. | External Low Pressure Gauge, Front Panel<br>Verify the following:<br>• Gauge reading is < 1 psi | |
| 32. | | Variable Power Supply<br>Main pwr sw   - off |
| 33. | | Disconnect the following hardware:<br>• Varible Power Supply from Power Source<br>• GSE Calibration Solenoid Test Box from Variable Power Supply |
| 34. | GASMAP Calibration Module, Front Panel<br>Disconnect the following:<br>• GSE Calibration Solenoid Test Box, P1 from GASMAP<br>• Calibration Module, J1 (SOL POWER) | |
| 36. | GASMAP Calibration Module, Front Panel<br>• Valve 1   - closed<br>• Valve 2   - closed<br>• Valve 3   - closed | |
| 37. | Disassemble all GASMAP hardware<br>Return the following hardware to Building 241 Controlled Storage:<br><br>Qty   Item<br>1   GASMAP Calibration Module<br>1   Catheter<br>1   GSE Calibration Solenoid Test Box<br>1   External Low Pressure Gauge<br>1   Power Cable<br>1   Variable Power Supply<br>1   Digital Multimeter | |

### 6.3.1.3    Clearing Errors

The following sequence is to be performed when the "ERROR" LED is illuminated on the GASMAP payload.  This sequence can be performed during the payload initial power up procedure, or can be executed at any time in Section 6.3.1.1 when the "ERROR" LED is illuminated.  If an "LOV" error exists on the GASMAP error log, this sequence MUST be followed by Analyzer Roughing in Section 6.3.1.4.  If an "LOV" error does not exist, clear the errors and proceed to Section 6.3.1.1.

### TABLE 6.23  CLEARING ERRORS

| Step | PRCU | HRF Rack 1 |
|---|---|---|
| 1. | GASMAP Analyzer Module, "Main Menu" Screen<br>Select:    "Low Pwr" <5><br>Select:    "Yes" <ENTER><br>Select:    "Diag" <3><br>Select:    "Display" <1><br>Select:    "Errors" <4><br>Select:    "Error Log" <1><br>Verify the following is displayed:<br>• "Diagnostic" Screen | |
| 2. | GASMAP Analyzer Module, "Diagnostic" Screen<br>Verify the following:<br>• The number of error entries currently recorded is displayed.<br>Select:    <1><br>For each error entry, perform the following:<br>• Log Error in test log<br>Select:    "Retriever Error Code" <1><br>Select:    "Acknowledge Error Code" <2><br>Select:    "Delete Error Code" <3><br>Select:    "Yes" <ENTER><br>Verify the following:<br>• All errors have been deleted<br><br>**NOTE**:  If LED is still illuminated, scroll down to look at the next entry in the file.  Repeat this step on all other error entries.<br><br>Select:    <MAIN MENU><br>Verify the following is displayed:<br>• "Main Menu" Screen<br><br>**NOTE**:  If the "LOV" error occurred, perform the Section 6.3.1.4 | |

### 6.3.1.4    Analyzer Roughing

This process is to be performed if an "LOV" error occurs during the execution of Section 6.3.1.3.  Once the roughing has been completed, the GASMAP unit must be powered off.  This may require the test engineer to repeat the complete GASMAP functional in Section 6.3.1.1.

## TABLE 6.24  ANALYZER ROUGHING

| Step | PRCU | HRF Rack 1 |
|---|---|---|
| 1. | GASMAP Analyzer Module, "Main Menu" Screen<br>Select:    "Roughing" | |
| 2. | Connect the following hardware:<br>• Roughing pump to GASMAP Analyzer Module<br>  (Roughing Port) | |
| 3. | Roughing pump,<br>Main pwr sw                                                      - on<br>Following instructions on Screen<br>Select:    <MAIN MENU> | |

### 6.3.2  Cooling Stowage Drawer

This section describes the procedures for the functional test of the Cooling Stowage Drawers.  The following table describes the flight units or equivalent hardware that may be used to perform off-line functional tests.

### TABLE 6.25  COOLING STOWAGE DRAWER HARDWARE

| Qty | Item | Class |
|---|---|---|
| 1 | Cooling Stowage Drawer | Flight |

The objective of this test is to assess the functionality of the Cooling Stowage Drawer to ensure the hardware is functioning properly before being integrated into the HRF Rack.

### TABLE 6.26  COOLING STOWAGE DRAWER

| Step | Payload | GSE Tech |
|---|---|---|
| 1. | Remove the following hardware from Building 241 Controlled Storage:<br><br>Qty      Item<br>1          Cooling Stowage Drawer<br>1          28 Vdc pwr cable<br>1          Variable Power Supply<br>1          Digital Volt Meter<br>1          Data Cable (Optional)<br>1          Ground Station Control (GSC) Power Cable<br>           (Optional)<br>1          Generic Breakout Box (Optional)<br>1          Switch (Optional)<br><br>**NOTE:**  Optional hardware is only needed for detailed functional checkout. | |

# TABLE 6.26  COOLING STOWAGE DRAWER (CONT'D)

| Step | Payload | GSE Tech |
|------|---------|----------|
| 2. | | Variable Power Supply<br>Verify the following:<br>Main pwr sw       - off<br><br>Record the following information:<br>  Model: _____<br>  NASA Tag #: _____<br>  Calibration #: _____<br>  Calibration Date: _____<br>           N/A: _____ T: _____ QA: _____<br><br>**NOTE:**  The following three steps are to perform a detailed checkout of the data connections. |
| 3. | | Connect the following hardware:<br>• Data Cable SED38115055-301 to Break Out Box |
| 4. | Connect the following hardware:<br>• Data Cable SED38115055-301 to Cooling Stowage Drawer | |
| 5. | | Digital Volt Meter<br>Verify the following:<br>• 1 amp short between pins 9 and 121<br>Record the following information:<br>  Model: _____<br>  NASA Tag #: _____<br>  Calibration #: _____<br>  Calibration Date: _____<br>           N/A: _____ T: _____ QA: _____<br>         (Previous three (3) steps) |
| 6. | | Connect the following hardware:<br>• 28 V dc pwr cable (GSE) to Variable Power Supply<br>• Variable Power Supply to Power Source |
| 7. | | Variable Power Supply, front panel<br>Main Power sw       - on<br>Set Value:       28 V<br>Set Value:       4 amps<br><br>**NOTE**:  If using a calibrated power supply, continue on with the following step:<br><br>Using Digital Volt Meter:<br>• Verify the voltage between pins 1 and 2 measures 28 ± 0.5 V dc<br><br>Record the following information:<br>  Model: _____<br>  NASA Tag #: _____<br>  Calibration #: _____<br>  Calibration Date: _____ |
| 8. | | Variable Power Supply<br>Main pwr sw       - off |
| 9. | Connect the following hardware:<br>• 28 V dc pwr cable (GSE) to Cooling Stowage Drawer (J1) | |
| 10. | | Variable Power Supply, front panel<br>Main Power sw       - on<br>Set Value:       28 V<br>Set Value:       4 amps |
| 11. | Cooling Stowage Drawer, Rear panel<br>Verify the following:<br>• Fan audibly engages<br>• Air exhaust is exiting payload | |

## TABLE 6.26  COOLING STOWAGE DRAWER (CONT'D)

| Step | Payload | GSE Tech |
|---|---|---|
| 12. | | Digital Volt Meter<br>Record the following:<br>• Voltage between pins 24 & 44:<br>\_\_\_\_\_ V dc (1.8 ± 0.6 V dc)<br><br>N/A: \_\_\_\_ T: \_\_\_\_ QA: \_\_\_\_ |
| 13. | | Variable Power Supply<br>Main pwr sw                                    - off |
| 14. | | Disconnect the following hardware:<br>• Variable Power Supply from Power Source<br>• 28 V dc pwr cable (GSE) from Cooling Stowage Drawer (J1)<br>• 28 V dc pwr cable (GSE) from Variable Power Supply |
| 15. | Disassemble Cooling Stowage Drawer hardware<br><br>Return the following hardware from Building 241 Controlled Storage:<br><br>Qty   Item<br>2     Cooling Stowage Drawer<br>1     28 Vdc pwr cable<br>1     Variable Power Supply<br>1     Digital Multimeter | |

T: \_\_\_\_\_  QA: \_\_\_\_\_

### 6.3.3      Ultrasound

The Ultrasound functional test confirms the Ultrasound System is working properly and focuses on the modified COTS ultrasound components.  The test accurately assesses eighty-five percent (85%) of the system and will confirm the functionality of those systems and the following subsystems:

• System Software
• Critical Data Pathways
• Video Tape Recorder Power/Power Supply Board
• Fans/Tachometer
• Direct Current (DC) Interface Module
• DC/DC Converter (Primary)
• Front Panel LED

The following list provides the flight units or equivalent hardware which may be used to perform off line functional tests.

## TABLE 6.27  ULTRASOUND HARDWARE

| Qty | Item | Class |
|---|---|---|
| 1 | Ultrasound Unit Assy | Flight |
| 1 | Keyboard Module Assy | Flight |
| 1 | Keyboard Cable Assy | Flight |
| 1 | External Monitor Cable Assy | Flight |
| 1 | Monitor Cable Assy | Flight |
| 1 | HRF Monitor | Flight |
| 1 | Transducer | Flight |

Once the Ultrasound payload has successfully completed functional testing, it can be integrated into the HRF Rack.

## TABLE 6.28  ULTRASOUND FUNCTIONAL CHECKOUT

| Step | Payload | GSE Tech |
|---|---|---|
| 1. | Remove the following hardware from Building 241 Controlled Storage:<br><br>Qty  Item<br>1    Ultrasound Unit Assembly<br>1    Keyboard Module Assy<br>1    Keyboard Cable Assy<br>1    Transducer<br>1    Monitor Cable Assy<br>1    GSE Power Cable<br>1    HRF Monitor<br>1    Ultrasound 28 Vdc pwr cable<br>1    Variable Power Supply<br>1    Digital Multimeter | |
| 2. | Assemble the hardware from above per Appendix B Figure 2 | |
| 3. | HRF Wrkstn, Front Panel<br>Verify the following:<br>• "VTR Power" sw    - off<br>• "Ultrasound Power" sw    - off | |
| 4. | Keyboard Module Assy, Left Side Panel<br>Verify the following:<br>"Standby Power" sw    - STBY | |
| 5. | HRF Monitor<br>Verify the following:<br>• Main pwr sw    - off | |
| 6. | | Variable Power Supply<br>Verify the following:<br>• Main pwr sw    - off<br><br>Record the following information:<br>Model: _____<br>NASA Tag #: _____<br>Calibration #: _____<br>Calibration Date: _____<br>        N/A: _____ T: _____ QA: _____ |
| 7. | | Connect the following hardware:<br>• Ultrasound 28 V dc pwr cable (GSE) to Variable Power Supply<br>• Variable Power Supply to Power Source |

TABLE 6.28  ULTRASOUND FUNCTIONAL CHECKOUT (CONT'D)

| Step | Payload | GSE Tech |
|------|---------|----------|
| 8. | | Variable Power Supply, front panel<br>Main Power sw    - on<br>Set Value:    28 V<br>Set Value:    40 amps<br><br>**NOTE**:  If using a calibrated power supply, continue on with the following step.<br><br>Using Digital Multimeter:<br>• Verify the voltage between pins 1 and 2 measures 28 $\pm$ 0.5 V dc<br><br>Record the following information:<br>  Model: _____<br>  NASA Tag #: _____<br>  Calibration #: _____<br>  Calibration Date: _____ |
| 9. | | Variable Power Supply<br>Main pwr sw    - off |
| 10. | Connect the following hardware:<br>• Ultrasound 28 V dc pwr cable (GSE) to Ultrasound Unit | |
| 11. | | Variable Power Supply, front panel<br>Main Power sw    - on<br>Set Value:    28 V<br>Set Value:    40 amps |
| 12. | HRF Monitor, Right Side Panel<br>Function sw    - Ultrasound<br>Main pwr sw    - on | |
| 13. | Ultrasound Unit Assy., front panel<br>"Ultrasound Power" sw    - on<br><br>**NOTE**:  Wait fifteen (15) seconds before proceeding. | |
| 14. | Keyboard Module Assy, Right Side Panel<br>"Standby Power" sw    - on | |
| 15. | Ultrasound Unit Assy., front panel<br>Verify the following:<br>• Ultrasound Power LED is on | |
| 16. | HRF Monitor, front panel<br>Verify the following appears:<br>• Sonogram Screen<br>• Operational Clock<br><br>**NOTE:**  If warning or error banners appear, record them in the error log by pressing the <Superkey><THI><0> two (2) times before proceeding with the following step.<br><br>Remove scanhead from the Ultrasound | |
| 17. | Keyboard Module Assy, Top Panel<br>Select:    <Superkey><0><br>Verify the following appears:<br>• Ultrasound Login display | |
| 18. | Keyboard Module Assy, Top Panel<br>At the "User" prompt:<br>Type:    csr<Enter><br>At the "Password" prompt:<br>Type:    user<Enter><br>Select:    "OK" button | |
| 19. | Keyboard Module Assy "Tests and Utilities" Screen<br>Select:    FREEZE<br>Select:    "Test, Utils" button<br>Verify the following appears:<br>• "Machine Components" Screen | |

## TABLE 6.28  ULTRASOUND FUNCTIONAL CHECKOUT (CONT'D)

| Step | Payload | GSE Tech |
|------|---------|----------|
| 20. | Keyboard Module Assy "Machine Components" Screen<br>Select:    "Machine…"<br>Verify the following:<br>• "2D Ultrasound" is highlighted | |
| 21. | Keyboard Module Assy "Machine Components" Screen<br>Select:    "Tests & Utils."<br>Verify the following:<br>• "Test and Utilities" Screen appears | |
| 22. | Keyboard Module Assy "Test and Utilities" Screen<br>Select:    End-to-End Test<br>Select:    "Execute" button<br>Verify the following:<br>• Test indicates PASS | |
| 23. | Keyboard Module Assy "Test and Utilities" Screen<br>Select:    Back-End Test<br>Select:    "Execute" button<br>• Wait approximately two (2) minutes<br>Verify the following:<br>• Test indicates PASS | |
| 24. | Keyboard Module Assy "Test and Utilities" Screen<br>Select:    "Components" button<br>Verify the following:<br>• "Machine Components" Screen appears | |
| 25. | Keyboard Module Assy "Machine Components" Screen<br>Select:    "Color Ultrasound"<br>Select:    "Test & Utils." Button<br>Verify the following:<br>• "Test and Utilities" Screen appears | |
| 26. | Keyboard Module Assy "Test and Utilities" Screen<br>Select:    End-to-End Test<br>Select:    "Execute" button<br>• Wait approximately two (2) minutes<br>Verify the following:<br>• Test indicates PASS | |
| 27. | Keyboard Module Assy "Tests and Utilities" Screen<br>Select:    Back-End Test<br>Select:    "Execute" button<br>Verify the following:<br>• Test indicates PASS | |
| 28. | Keyboard Module Assy "Tests and Utilities" Screen<br>Select:    "Components"<br>Select:    "Go to Top Level…" button<br>Select:    "Machine…"<br>Select:    "Test & Utils." Button<br>Verify the following:<br>• "Test and Utilities" screen appears | |
| 29. | Keyboard Module Assy "Test and Utilities" Screen<br>Select:    "Comprehensive Test"<br>Select:    "Execute" button<br><br>**NOTE:**  Execution of this test takes approximately twenty (20) minutes.<br><br>Verify the following:<br>• Test indicates PASS | |
| 30. | Keyboard Module Assy "Test and Utilities" Screen<br>Select:    "Close"<br>Verify the following:<br>• "ATL" window appears | |

## TABLE 6.28  ULTRASOUND FUNCTIONAL CHECKOUT (CONT'D)

| Step | Payload | GSE Tech |
|------|---------|----------|
| 31. | Reattach Scanhead to Ultrasound Unit<br><br>**NOTE:** Reattach Scanhead by keeping the handle in an upright position and slide Scanhead back to connect to the Ultrasound unit.  Lock in place by rotating the handle to the right. | |
| 32. | Keyboard Module Assy "ATL" Window<br>Select:    "REBOOT" | |
| 33. | HRF Monitor, front panel<br>Verify the following appears:<br>• Sonogram Screen<br>• Operational Clock<br><br>**NOTE:**  If warning or error banners appear, record them in the error log by pressing the &lt;Superkey&gt;&lt;THI&gt;&lt;0&gt; two (2) times. | |
| 34. | Keyboard Module Assy, Left Side Panel<br>"Main" sw                                      - STBY | |
| 35. | Ultrasound Unit Assy., front panel<br>Verify the following:<br>• Ultrasound Power LED is off | |
| 36. | HRF Monitor, Front Panel<br>Verify the following:<br>• Display disappears | |
| 37. | Ultrasound Unit Assy., front panel<br>"Ultrasound Power" sw                       - off | |
| 38. | HRF Monitor,<br>Panel pwr                                           - off<br>Main Power sw                                  - off | |
| 39. | | Variable Power Supply, front panel<br>Main Power sw                                  - off |
| 40. | | Disconnect the following hardware:<br>• Variable Power Supply from Power Source<br>• Ultrasound 28 V dc pwr cable (GSE) from HRF Wrkstn (J1)<br>• Ultrasound 28 V dc pwr cable (GSE) from Variable Power Supply |
| 41. | Disassemble All Ultrasound hardware<br><br>Return the following items to Building 241 Controlled Storage<br><br>Qty    Item<br>1      Ultrasound Unit Assy.<br>1      Keyboard Module Assy<br>1      Keyboard Cable Assy<br>1      Monitor Cable Assy<br>1      HRF Monitor<br>1      Ultrasound 28 Vdc pwr cable<br>1      Variable Power Supply<br>1      Digital Multimeter | |

T: _____  QA: _____

### 6.3.4    Workstation

This section describes the procedures for the functional test of the Workstation payload drawer.

The following table describes the flight units or equivalent hardware that may be used to perform off-line functional tests.

### TABLE 6.29  WORKSTATION HARDWARE

| Qty | Item | Class |
|-----|------|-------|
| 1 | HRF Workstation | Flight |
| 1 | HRF Workstation Keyboard | Flight |
| 1 | HRF Monitor | Flight |
| 1 | Workstation Monitor Cable | Flight |
| 1 | Workstation (WS) Keyboard/Mouse cable | Flight |
| 1 | Serial cable | Flight |

Once the Workstation payload has successfully completed functional testing, it can be integrated into the HRF Rack.

### TABLE 6.30  WORKSTATION FUNCTIONAL

| Step | Payload | GSE Tech |
|------|---------|----------|
| 1. | Remove the following hardware from Building 241 Controlled Storage:<br><br>Qty   Item<br>1     HRF Wrkstn<br>1     HRF Wrkstn keyboard<br>1     HRF Monitor<br>1     Wrkstn Monitor cable<br>1     WS Keyboard/Mouse cable<br>1     Serial cable<br>1     28 Vdc cable<br>1     Variable Power Supply<br>1     Digital Multimeter | |
| 2. | HRF Wrkstn, Front Panel<br>Verify the following:<br>• "Main Power" sw     - off | |
| 3. | HRF Monitor<br>Verify the following:<br>• Main pwr sw     - off | |
| 4. | Assemble the hardware from above per Figure B-3 Connections for WS Testing | |
| 5. | | Variable Power Supply<br>Verify the following:<br>• Main pwr sw     - off<br><br>Record the following information:<br>Model: _____<br>NASA Tag #: _____<br>Calibration #: _____<br>Calibration Date: _____<br>N/A: ____ T: ____ QA: ____ |

# TABLE 6.30  WORKSTATION FUNCTIONAL (CONT'D)

| Step | Payload | GSE Tech |
|------|---------|----------|
| 6. | | Connect the following hardware:<br>• 28 V dc pwr cable (GSE) to Variable Power Supply<br>• Variable Power Supply to Power Source |
| 7. | | Variable Power Supply, front panel<br>Main Power sw     - on<br>Set Value:     28 V<br>Set Value:     10<br>amps<br><br>**NOTE**:  If using a calibrated power supply, continue on with the following step.<br><br>Using Digital Multimeter:<br>• Verify the voltage between pins 1 and 2 measures 28 $\pm$ 0.5 V dc<br><br>Record the following information:<br> Model: _____<br> NASA Tag #: _____<br> Calibration #: _____<br> Calibration Date: _____ |
| 8. | | Variable Power Supply<br>• Main pwr sw     - off |
| 9. | | Connect the following hardware:<br>• 28 V dc pwr cable (GSE) to HRF Wrkstn (J1) |
| 10. | | Variable Power Supply, front panel<br>Main Power sw     - on<br>Set Value:     28 V<br>Set Value:     10 amps |
| 11. | HRF Wrkstn, Front Panel<br>"Main Power" sw     - on<br>Verify the following:<br>• Main Power LED is illuminated green | |
| 12. | HRF Monitor, Front Panel<br>Function sw     - Wrkstn<br>"Main Power" sw     - on<br>Verify the following:<br>• Main Power LED is illuminated green | |
| 13. | HRF Monitor<br>Select: "Window NT 4.0" <ENTER><br><br>**NOTE**:  Wrkstn will automatically boot into Windows NT 4.0 after thirty (30) seconds if no user input is provided.<br><br>Verify the following is displayed:<br>• "Press Ctrl + Alt + Delete to log on" Dialog box | |
| 14. | HRF Wrkstn, "Press Ctrl + Alt +…" Dialog box<br>Select: <Ctrl><Alt><Delete><br>Verify the following is displayed:<br>• "Login Information" Window | |
| 15. | HRF Wrkstn, "Login Information" Window<br><u>AT "user" prompt</u>:<br>Type: "administrator"<br><u>At "password" prompt</u>:<br>Select: "hrf"<br>Verify the following:<br>• "Windows NT" desktop appears | |
| 16. | HRF Wrkstn, "Windows NT" desktop<br>Select: "Start" menu<br>Navigate to: "CSW User Interface"<br>Verify the following:<br>• "HRF" screen appears | |

TABLE 6.30  WORKSTATION FUNCTIONAL (CONT'D)

| Step | Payload | GSE Tech |
|------|---------|----------|
| 17. | HRF Wrkstn, "HRF" Screen<br>Select:    "HRF Exit" button<br>Verify the following:<br>• Dialog box appears | |
| 18. | HRF Wrkstn, dialog box<br>Select:    "Yes" button<br>Verify the following:<br>• "Windows NT" desktop appears | |
| 19. | HRF Wrkstn, "Windows NT" desktop<br>Select:    "Start" menu<br>Select:    "Programs"<br>Select:    "Wrkstn"<br>Verify the following:<br>• "Wrkstn" window appears | |
| 20. | HRF Wrkstn, "Wrkstn" Window<br>Select:    "Individual tests" button<br>Select:    "Graphics test" button<br>Verify the following:<br>• Dialog box appears<br><br>**NOTE:**  Execution of this test takes approximately twenty (20) minutes. | |
| 21. | HRF Wrkstn, Dialog box<br>Select:    "Yes" button | |
| 22. | HRF Wrkstn, "Wrkstn" Window<br>Verify the following:<br>• "Graphics Test:  "OK" message appears | |
| 23. | HRF Wrkstn, "Wrkstn" Window<br>Select:    "Exit" button<br>Verify the following:<br>• Dialog box appears | |
| 24. | HRF Wrkstn, Dialog box<br>Select:    "Yes" button<br>Verify the following:<br>• "Windows NT" desktop appears | |
| 25. | HRF Wrkstn, "Windows" desktop<br>Select:    "Start" menu<br>Select:    "Shutdown"<br>Verify the following is displayed:<br>• "Shut Down Windows" Window | |
| 26. | HRF Wrkstn, "Shut Down Windows" Window<br>Select:    "YES" button<br>Verify the following is displayed:<br>• "It is now safe to turn off your computer" message | |
| 27. | HRF Wrkstn, Front Panel<br>"Main Power" sw                                    - off<br>Verify the following:<br>• "Main Power" LED is not illuminated | |
| 28. | HRF Monitor<br>Panel Pwr                                               - off<br>Main pwr sw                                          - off<br>Verify the following:<br>• "Main Power" LED is not illuminated | |
| 29. | HRF Wrkstn, Front Panel<br>28 V dc pwr sw                                  - off<br>Verify the following:<br>• 28 V dc LED is not illuminated | |
| 30. | | Variable Power Supply<br>Main pwr sw                                          - off |
| 31. | | Disconnect the following hardware:<br>• Variable Power Supply from Power Source<br>• 28 V dc pwr cable (GSE) from HRF Wrkstn (J1)<br>• 28 V dc pwr cable (GSE) from Variable Power Supply |

TABLE 6.30  WORKSTATION FUNCTIONAL (CONT'D)

| Step | Payload | GSE Tech |
|---|---|---|
| 32. | Disassemble Wrkstn hardware<br><br>Return the following hardware from Building 241 Controlled Storage:<br><br>Qty   Item<br>1      HRF Wrkstn<br>1      HRF Wrkstn keyboard<br>1      HRF Monitor<br>1      Wrkstn Monitor cable<br>1      WS Keyboard/Mouse cable<br>1      Serial cable<br>1      28 Vdc cable<br>1      Variable Power Supply<br>1      Digital Multimeter | |

T: _____  QA: _____

6.3.5        Test Support System Functional

The following list provides the hardware that may be used to perform functional tests.

TABLE 6.31  TEST SUPPORT SYSTEM HARDWARE

| Qty | Item | Class |
|---|---|---|
| 1 | Test Support System | GSE |
| 1 | Signal Adapter Box | GSE |
| 1 | SAB/Laptop RS232 Cable | GSE |
| 1 | SAB/Laptop Video Cable | GSE |
| 2 | SAB/BOB Interface Cable | GSE |
| 1 | Ethernet Cable | GSE |
| 2 | DAQCARD Interface | GSE |
| 2 | Portable Computer Memory Card International Adapter (PCMCIA) Card | GSE |
| 1 | Interface Cable | GSE |
| 1 | Interface Cable | GSE |
| 1 | IBM Video Adapter Cable | GSE |
| 1 | Ethernet PCMCIA Card | |
| 2 | BOB | GSE |

Once the Test Support System has successfully completed functional testing, it is considered operational and can be used during testing of the HRF Rack.

## TABLE 6.32  TEST SUPPORT SYSTEM FUNCTIONAL CHECKOUT

| Step | Payload | Tech Functional Checkout |
|------|---------|--------------------------|
| 1. | Remove the following hardware from Building 241 Controlled Storage:<br><br>Qty    Item<br>1    TSS Laptop<br>2    DAQCARD<br>1    PA50-50F<br>2    DAQ 1200/SAB interface cable<br>1    SAB<br>1    Ethernet PCMCIA card<br>1    3C-PC-COMBO-Commercial Bills of Lading (CBL)<br>1    Ethernet cable<br>1    Video Adapter cable<br>1    SAB/laptop Video cable<br>1    SAB/Laptop RS-232 cable<br>2    BOB<br>1    GSE Power cable<br>1    Variable Power Supply<br>1    Digital Multimeter<br>2    SAB/BOB Interface Cable | |
| 2. | Assemble hardware per Appendix B Figure 7 & 8 | |
| 3. | BOB1 front panel<br>"DATA" sw    - off | |
| 4. | BOB2 front panel<br>DATA" sw    - off | |
| 5. | TSS Laptop<br>pwr    - off | |
| 6. | | Variable Power Supply<br>Verify the following:<br>Main pwr sw    - off<br><br>Record the following information:<br>   Model: _____<br>   NASA Tag #: _____<br>   Calibration #: _____<br>   Calibration Date: _____<br>          N/A: ____ T: ____ QA: ____ |
| 7. | | Connect the following hardware:<br>• GSE Power Cable to Variable Power Supply<br>• Variable Power Supply to Power Source |
| 8. | | Variable Power Supply, front panel<br>Main Power sw    - on<br>Set Value:    28 V<br>Set Value:    25 amps<br><br>**NOTE**:  If using a calibrated power supply, continue on with the following step.  If powering two (2) BOB simultaneously, set amperage to fifty (50) amps.<br><br>Using Digital Multimeter:<br>• Verify the voltage between pins 1 and 2 measures $28 \pm 0.5$ V dc<br><br>Record the following information:<br>   Model: _____<br>   NASA Tag #: _____<br>   Calibration #: _____<br>   Calibration Date: _____ |

# TABLE 6.32  TEST SUPPORT SYSTEM FUNCTIONAL CHECKOUT (CONT'D)

| Step | Payload | Tech Functional Checkout |
|---|---|---|
| 9. | | Variable Power Supply<br>Main pwr sw                    - off |
| 10. | | Connect the following hardware:<br>• BOB1 to Variable Power Supply<br>• BOB2 to Variable Power Supply |
| 11. | | Variable Power Supply, front panel<br>Main Power sw             - on<br>Set Value:           28 V<br>Set Value:           25 amps |
| 12. | TSS laptop left side panel,<br>Main pwr sw               - on | |
| 13. | TSS laptop display,<br>Verify the following:<br>• "Windows 95" executes | |
| 14. | TSS laptop display "Windows NT" desktop<br>Select:  "Start" menu<br>Select:  "Programs" icon<br>Select:  "National Instruments DAQ" icon<br>Select:  "NI-DAQ" test panels<br>Verify the following is displayed:<br>• "Choose a Device" Window | |
| 15. | TSS laptop display "Choose a Device" Window<br>Select:  "Device #1 DAQCARD 1200"<br>Select:  "OK" button<br>Verify the following is displayed:<br>• "Test Panel" Window | |
| 16. | TSS laptop display "Test Panel" Window<br>Verify "Fatal Error" light is illuminated gray<br>Select:  "CLOSE" button<br>Verify the following is displayed:<br>• "Windows 95" desktop | |
| 17. | TSS laptop display "Windows NT" desktop<br>Select:  "Start" menu<br>Select:  "Programs" icon<br>Select:  "National Instruments DAQ" icon<br>Select:  "NI-DAQ" test panels<br>Verify the following is displayed:<br>• "Choose a Device" Window | |
| 18. | TSS laptop display "Choose a Device" Window<br>Select:  "Device #2 DAQCARD 1200"<br>Select:  "OK" button<br>Verify the following is displayed:<br>• "Test Panel" Window | |
| 19. | TSS laptop display "Test Panel" Window<br>Verify the following:<br>• "Fatal Error" light is illuminated gray<br>Select:  "CLOSE" button<br>Verify the following is displayed:<br>• "Windows 95" desktop | |
| 20. | TSS laptop display "Windows 95" desktop<br>Select:  "Start" menu<br>Select:  "Settings" icon<br>Select:  "Control Panels" icon<br>Select:  "Network" icon<br>Select:  "TCP/IP -> 3 COM …" command<br>Verify the following is displayed:<br>• "Network" Window | |
| 21. | TSS laptop display "Network" Window<br>• Record IP address:     _____<br>Select:  "OK" button<br>Select:  "OK" button<br>Verify the following is displayed:<br>• "Control Panel" Window | |

# TABLE 6.32  TEST SUPPORT SYSTEM FUNCTIONAL CHECKOUT (CONT'D)

| Step | Payload | Tech Functional Checkout |
|---|---|---|
| 22. | TSS laptop display "Control Panel" Window<br>Select:    "File" menu<br>Select:    "Close"<br>Verify the following is displayed:<br>• "Windows 95" desktop | |
| 23. | TSS laptop display "Windows 95" desktop<br>Select:    "Start" menu<br>Select:    "Programs" icon<br>Select:    "MS-DOS Prompt"<br>Verify the following is displayed:<br>• "MS-DOS" Window | |
| 24. | TSS laptop display "MS-DOS" Window<br>Verify the following is displayed:<br>• "c:\Windows>" prompt | |
| 25. | TSS laptop<br>• Type:          Ping [Insert IP address from step 21.]<br>                          <Enter> | |
| 26. | TSS laptop display "MS-DOS" Window<br>Verify the following is displayed:<br>• "Reply" response | |
| 27. | TSS laptop<br>• Type:          exit                           <Enter><br>Verify the following is displayed:<br>• "Windows 95" desktop | |
| 28. | TSS laptop display "Windows 95" desktop<br>Select:    "START" button<br>Select:    "I&ES Simulator (Start).exe" icon<br>Verify the following is displayed:<br>• "I&ES Configuration" Window | |
| 29. | TSS laptop display "I&ES Configuration" Window<br>Select:    "START" button<br><br>**NOTE**:  Wait fifteen (15) seconds for boot up of I&ES software.<br><br>Verify the following is displayed:<br>• "I&ES Simulator 1" Window<br>• "I&ES Simulator 2" Window | |
| 30. | TSS laptop display "I&ES Simulator 1" Window<br>Select:    Stop Simulator 1 "QUIT" button | |
| 31. | TSS laptop display "I&ES Simulator 1" Window<br>Select:    Stop Simulator 2 "QUIT" button<br>Verify the following is displayed:<br>• "Windows 95" desktop | |
| 32. | TSS laptop display "Windows 95" desktop<br>Select:    "Start" menu<br>Select:    "Shutdown" icon<br>Verify the following is displayed:<br>• "Shutdown" Window | |
| 33. | TSS laptop display "Shutdown" Window<br>Select:    "YES" button | |
| 34. | | BOB1 front panel<br>Verify the following:<br>2.5 amp sw                                              - off<br>5 amp sw                                                 - off<br>5 amp sw                                                 - off<br>5 amp sw                                                 - off<br>5 amp sw                                                 - off |

## TABLE 6.32  TEST SUPPORT SYSTEM FUNCTIONAL CHECKOUT (CONT'D)

| Step | Payload | Tech |
|---|---|---|
| 35. | | BOB1 front panel<br>Data sw   - on<br>Verify data LED   - on<br>Fan sw   - on<br>Verify the following:<br>• 2.5 amp LED   - off<br>• 5 amp LED   - off<br>• 5 amp LED   - off<br>• 5 amp LED   - off<br>• 5 amp LED   - off |
| 36. | | BOB1 front panel<br>2.5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - on<br>Verify the following:<br>• 2.5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - on |
| 37. | | BOB1 front panel<br>2.5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - off<br>Verify the following:<br>• 2.5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - off |
| 38. | | BOB1 front panel<br>2.5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - off<br>5 amp sw   - off<br>Verify the following:<br>• 2.5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - off<br>• 5 amp LED   - off |
| 39. | | BOB1 front panel<br>2.5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - off<br>5 amp sw   - off<br>5 amp sw   - off<br>Verify the following:<br>• 2.5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - off<br>• 5 amp LED   - off<br>• 5 amp LED   - off |

TABLE 6.32  TEST SUPPORT SYSTEM FUNCTIONAL CHECKOUT (CONT'D)

| Step | Payload | Tech |
|---|---|---|
| 40. | | BOB1 front panel<br>2.5 amp sw      - on<br>5 amp sw      - off<br>5 amp sw      - off<br>5 amp sw      - off<br>5 amp sw      - off<br>Verify the following:<br>• 2.5 amp LED      - on<br>• 5 amp LED      - off<br>• 5 amp LED      - off<br>• 5 amp LED      - off<br>• 5 amp LED      - off |
| 41. | | BOB1 front panel<br>2.5 amp sw      - off<br>5 amp sw      - off<br>5 amp sw      - off<br>5 amp sw      - off<br>5 amp sw      - off<br>Verify the following:<br>• 2.5 amp LED      - off<br>• 5 amp LED      - off<br>• 5 amp LED      - off<br>• 5 amp LED      - off<br>• 5 amp LED      - off<br><br>**NOTE**: After continuous operation of loads in excess of five (5) minutes, the fan must be allowed to run for ten (10) minutes. |
| 42. | | BOB1 front panel<br>Data sw      - off<br>Verify data LED      - off<br>Fan sw      - off |
| 43. | | BOB2 front panel<br>Verify the following:<br>2.5 amp sw      - off<br>5 amp sw      - off<br>5 amp sw      - off<br>5 amp sw      - off<br>5 amp sw      - off |
| 44. | | BOB2 front panel<br>Data sw      - on<br>Verify data LED      - on<br>Fan sw      - on<br>Verify the following:<br>• 2.5 amp LED      - off<br>• 5 amp LED      - off<br>• 5 amp LED      - off<br>• 5 amp LED      - off<br>• 5 amp LED      - off |
| 45. | | BOB2 front panel<br>2.5 amp sw      - on<br>5 amp sw      - on<br>5 amp sw      - on<br>5 amp sw      - on<br>5 amp sw      - on<br>Verify the following:<br>• 2.5 amp LED      - on<br>• 5 amp LED      - on<br>• 5 amp LED      - on<br>• 5 amp LED      - on<br>• 5 amp LED      - on |

## TABLE 6.32  TEST SUPPORT SYSTEM FUNCTIONAL CHECKOUT (CONT'D)

| Step | Payload | Tech |
|---|---|---|
| 46. | | BOB2 front panel<br>2.5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - off<br>Verify the following:<br>• 2.5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - off |
| 47. | | BOB2 front panel<br>2.5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - off<br>5 amp sw   - off<br>Verify the following:<br>• 2.5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - off<br>• 5 amp LED   - off |
| 48. | | BOB2 front panel<br>2.5 amp sw   - on<br>5 amp sw   - on<br>5 amp sw   - off<br>5 amp sw   - off<br>5 amp sw   - off<br>Verify the following:<br>• 2.5 amp LED   - on<br>• 5 amp LED   - on<br>• 5 amp LED   - off<br>• 5 amp LED   - off<br>• 5 amp LED   - off |
| 49. | | BOB2 front panel<br>2.5 amp sw   - on<br>5 amp sw   - off<br>5 amp sw   - off<br>5 amp sw   - off<br>5 amp sw   - off<br>Verify the following:<br>• 2.5 amp LED   - on<br>• 5 amp LED   - off<br>• 5 amp LED   - off<br>• 5 amp LED   - off<br>• 5 amp LED   - off |
| 50. | | BOB2 front panel<br>2.5 amp sw   - off<br>5 amp sw   - off<br>5 amp sw   - off<br>5 amp sw   - off<br>5 amp sw   - off<br>Verify the following:<br>• 2.5 amp LED   - off<br>• 5 amp LED   - off<br>• 5 amp LED   - off<br>• 5 amp LED   - off<br>• 5 amp LED   - off<br><br>**NOTE**:  After continuous operation of loads in excess of five (5) minutes, the fan must be allowed to run for ten (10) minutes. |

TABLE 6.32  TEST SUPPORT SYSTEM FUNCTIONAL CHECKOUT (CONT'D)

| Step | Payload | Tech |
|---|---|---|
| 51. | | BOB2 front panel<br>Data sw                                                     - off<br>Verify data LED                                   - off<br>Fan sw                                                      - off |
| 52. | | Variable Power Supply<br>Main pwr sw                                           - off |
| 53. | | Disconnect the following hardware:<br>• Variable Power Supply from Power Source<br>• BOB1 from Variable Power Supply<br>• BOB2 from Variable Power Supply |
| 54. | Disassemble all Test Support System hardware<br><br>Return the following hardware to Building 241 Controlled Storage:<br><br>Qty      Item<br>1         TSS Laptop<br>2         DAQCARD<br>2         PA50-50F<br>2         DAQ 1200/SAB interface cable<br>1         SAB<br>1         Ethernet PCMCIA card<br>1         3C-PC-COMBO-CBL<br>1         Ethernet cable<br>1         Video Adapter cable<br>1         SAB/laptop Video cable<br>1         SAB/Laptop RS-232 cable<br>2         BOB<br>1         GSE Power cable<br>1         Variable Power Supply<br>1         Digital Multimeter<br>2         SAB/BOB Interface Cable | |

T: _____  QA: _____

## 6.4        DEMATING OF PAYLOAD RACK FROM ISPR PANEL

### 6.4.1        <u>Moderate Temperature Cooling Interface</u>

#### 6.4.1.1        PRCU Connector Savers

TABLE 6.33  PRCU CONNECTOR SAVERS

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 1. | Verify the following:<br>• PRCU fluid sample is in spec per SSP30573<br>• PEPSE facility breaker is OFF | Verify the following:<br>• HRF Rack fluid sample is in spec per SSP30573 | |
| 2. | | Inspect the following hardware for damage:<br>• TCS Mod Supply hose<br>• CS Assy 683-27567-2 | |
| 3. | | Inspect the following hardware for damage:<br>• TCS Mod Return hose<br>• CS Assy 683-27567-4 | |
| 4. | | Disconnect the following hardware:<br>• TCS Mod Return hose P/N from CS Assy P/N 683-27567-4 | |

## TABLE 6.33  PRCU CONNECTOR SAVERS (CONT'D)

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 5. | | Disconnect the following hardware:<br>• CS Assy P/N 683-27567-4 from ISPR Panel (MOD TEMP TCS RETURN) | |
| 6. | | Connect the following hardware:<br>• TCS Mod Supply hose bracket to T-bar Assy<br>• TCS Mod Return hose to T-bar Assy | N/A: _____ T: _____ QA: _____ |

T: _____ QA: _____

## 6.4.1.2    GSE Transfer Hose

## TABLE 6.34  GSE TRANSFER HOSE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 1. | Verify the following:<br>• PRCU fluid sample is in spec per SSP30573<br>• PEPSE facility breaker is OFF | Verify the following:<br>• HRF Rack fluid sample is in spec per SSP30573 | |
| 2. | Disconnect the following hardware:<br>• GSE Transfer Supply hose P/N from ISPR Panel (MOD TEMP TCS SUPPLY) | | |
| 3. | Disconnect the following hardware:<br>• GSE Transfer Return hose P/N from ISPR Panel (MOD TEMP TCS RETURN) | | |
| 4. | | Inspect the following hardware for damage:<br>• GSE Transfer TCS Mod Supply hose<br>• GSE Transfer Return hose | |
| 5. | | Inspect the following hardware for damage:<br>• TCS Mod Return hose | |
| 6. | | Disconnect the following hardware:<br>• TCS Mod Supply hose from GSE Transfer Supply hose | |
| 7. | | Disconnect the following hardware:<br>• TCS Mod Return hose from GSE Transfer Return hose | N/A: _____ T: _____ QA: _____ |
| 8. | | Disconnect the following hardware:<br>• GSE Transfer Supply hose to T-bar Assy<br>• GSE Transfer Return hose to T-bar Assy | N/A: _____ T: _____ QA: _____ |

T: _____ QA: _____

### 6.4.2　GN₂ Interface

#### TABLE 6.35  GN₂ INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 1. | | Disconnect the following hardware:<br>• GN₂ hose to CS Assy P/N 683-27587-1 | |
| 2. | | Connect the following hardware:<br>• CS Assy P/N 683-27587-1 from ISPR Panel (GN₂) | |
| 3. | | Inspect the following hardware for damage:<br>• GN₂ hose<br>• CS Assy 683-27587-1 | |
| 4. | | Connect the following hardware:<br>• GN₂ hose to T-bar Assy | N/A: _____ T: _____ QA: _____ |

T: _____ QA: _____

### 6.4.3　Vacuum Interface

#### TABLE 6.36  VACUUM INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 1. | | Disconnect the following hardware:<br>• Vacuum Resource hose from CS Assy P/N 683-27552-1 | |
| 2. | | Disconnect the following hardware:<br>• CS Assy P/N 683-27552-1 from ISPR Panel (VRS) | |
| 3. | | Disconnect the following hardware:<br>• Vacuum Waste Gas hose from CS Assy P/N 683-27552-2 | |
| 4. | | Disconnect the following hardware:<br>• CS Assy P/N 683-27552-2 from ISPR Panel (VES) | |
| 5. | | Inspect the following hardware for damage:<br>• Vacuum Resource hose<br>• CS Assy 683-27552-1 | |
| 6. | | Inspect the following hardware for damage:<br>• Vacuum Waste Gas hose<br>• CS Assy 683-27552-2 | |
| 7. | | Connect the following hardware:<br>• Vacuum Waste Gas hose to T-bar Assy<br>• Vacuum Resource hose to T-bar Assy | N/A: _____ T: _____ QA: _____ |

T: _____ QA: _____

### 6.4.4 Power Interfaces

### 6.4.4.1 Main Power Interface

#### TABLE 6.37  MAIN POWER INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 1. | Verify the following:<br>• POWER (J1) LED      - off<br>• AUX POWER (J2) LED    - off | | |
| 2. | | Disconnect the following hardware:<br>• UIP-P1 from CS Assy (J1) P/N 683-27524-1<br>• CS Assy (E1) P/N 683-27524-1 from Rack Handler Base | |
| 3. | Disconnect the following hardware:<br>• CS Assy (P1) P/N 683-27524-1 from ISPR Panel (J1 POWER) | | |
| 4. | | Inspect the following hardware for damage:<br>• UIP-P1 Cable<br>• CS Assy P/N 683-27524-1 | |
| 5. | Connect the following hardware:<br>• Dust cap to ISPR panel (J1) | | |
| 6. | | Connect the following hardware:<br>• UIP-P1 Cable to HRF Rack (Dust cap J1) | |

T: _____ QA: _____

### 6.4.4.2 Auxiliary Power Interface

#### TABLE 6.38  AUXILIARY POWER INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 1. | Verify the following:<br>• POWER (J1) LED      - off<br>• AUX POWER (J2) LED    - off | | |
| 2. | | Disconnect the following hardware:<br>• UIP-P2 from CS Assy (J2) P/N 683-27524-2<br>• CS Assy (E1) P/N 683-27524-2 from Rack Handler Base | |
| 3. | Disconnect the following hardware:<br>• CS Assy (P2) P/N 683-27524-2 from ISPR Panel (J2 AUX POWER) | | |
| 4. | | Inspect the following hardware for damage:<br>• UIP-P2 Cable<br>• CS Assy P/N 683-27524-2 | |
| 5. | Connect the following hardware:<br>• Dust cap to ISPR panel (J2) | | |
| 6. | | Connect the following hardware:<br>• UIP-P2 Cable to HRF Rack (Dust cap J2) | |

T: _____ QA: _____

### 6.4.5    Video Interface

#### TABLE 6.39  VIDEO INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 1. | Verify the following:<br>• Main Power (J1) LED          - off<br>• AUX Power (J2) LED          - off | | |
| 2. | | Disconnect the following hardware:<br>• UIP-P16 from CS Assy (J16) P/N 683-27524-6 | |
| 3. | Disconnect the following hardware:<br>• CS Assy (P16) P/N 683-27524-6 from ISPR Panel (J16 VIDEO, LINE 1)<br>• CS Assy (P16) P/N 683-27524-6 from ISPR Panel (J16 VIDEO, LINE 2)<br>• CS Assy (P16) P/N 683-27524-6 from ISPR Panel (J16 VIDEO, SYNC) | | |
| 4. | | Disconnect the following hardware:<br>• UIP-P77 from CS Assy (J77) P/N 683-27524-10 | N/A: _____ T: _____ QA: _____ |
| 5. | | Disconnect the following hardware:<br>• CS Assy (P77) P/N 683-27524-10 from ISPR Panel (J77 VIDEO) | N/A: _____ T: _____ QA: _____ |
| 6. | | Inspect the following hardware for damage:<br>• UIP-P77 Cable<br>• CS Assy P/N 683-27524-10 | N/A: _____ T: _____ QA: _____ |
| 7. | | Inspect the following hardware for damage:<br>• UIP-P16 Cable<br>• CS Assy P/N 683-27524-6 | |
| 8. | | Connect the following hardware:<br>• UIP-P77 Cable to HRF Rack (Dust cap J77) | N/A: _____ T: _____ QA: _____ |
| 9. | Connect the following hardware:<br>• Dust cap to ISPR panel (J16) | | |
| 10. | | Connect the following hardware:<br>• UIP-P16 Cable to HRF Rack (Dust cap J16) | |

T: _____ QA: _____

### 6.4.6    HRDL Interface

#### TABLE 6.40  HRDL INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 1. | Verify the following:<br>• POWER (J1) LED          - off<br>• AUX POWER (J2) LED          - off | | |
| 2. | | Disconnect the following hardware:<br>• UIP-P7 from CS Assy (J7) P/N 683-27524-5 | |
| 3. | | Disconnect the following hardware:<br>• CS Assy (P1) P/N 683-27524-5 from ISPR Panel (J7-TX HRDL) | |
| 4. | | Inspect the following hardware for damage:<br>• UIP-P7 Cable<br>• CS Assy P/N 683-27524-5 | |

## TABLE 6.40  HRDL INTERFACE (CONT'D)

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|-----------|-----------|
| 5. | Connect the following hardware:<br>• Dust cap to ISPR panel (J7) | | |
| 6. | | Connect the following hardware:<br>• UIP-P7 Cable to HRF Rack (Dust cap J7) | |

T: _____  QA: _____

### 6.4.7  FDS Maintenance Interface

## TABLE 6.41  FDS MAINTENANCE INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|-----------|-----------|
| 1. | Verify the following:<br>• POWER (J1) LED          - off<br>• AUX POWER (J2) LED       - off | | |
| 2. | | Disconnect the following hardware:<br>• UIP-P43 from CS Assy (J43) P/N 683-27524-7 | |
| 3. | Disconnect the following hardware:<br>• CS Assy (P43) P/N 683-27524-7 from ISPR Panel (J43 FDS MAINT) | | |
| 4. | | Inspect the following hardware for damage:<br>• UIP-P43 Cable<br>• CS Assy P/N 683-27524-7 | |
| 5. | Connect the following hardware:<br>• Dust cap to ISPR panel (J43) | | |
| 6. | | Connect the following hardware:<br>• UIP-P43 Cable to HRF Rack (Dust cap J43) | |

T: _____  QA: _____

### 6.4.8  1553B Interfaces

### 6.4.8.1  Bus A Interface

## TABLE 6.42  BUS A INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|-----------|-----------|
| 1. | Verify the following:<br>• POWER (J1) LED          - off<br>• POWER (J2) LED          - off | | |
| 2. | | Disconnect the following hardware:<br>• UIP-P3 from CS Assy (J3) P/N 683-27524-3 | |
| 3. | Disconnect the following hardware:<br>• CS Assy (P3) P/N 683-27524-3 from ISPR Panel (J3 BUS A)<br>• CS Assy (P7) P/N 683-27524-3 from 1553 ADDRESS TERMINATOR Assy (J7) | | |

## TABLE 6.42  BUS A INTERFACE (CONT'D)

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 4. | | Inspect the following hardware for damage:<br>• UIP-P3 Cable<br>• CS Assy P/N 683-27524-3 | |
| 5. | Connect the following hardware:<br>• Dust cap to ISPR panel (J3) | | |
| 6. | | Connect the following hardware:<br>• UIP-P3 Cable to HRF Rack (Dust cap J3) | |

T: _____ QA: _____

## 6.4.8.2    Bus B Interface

## TABLE 6.43  BUS B INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 1. | Verify the following:<br>• POWER (J1) LED        - off<br>• POWER (J2) LED        - off | | |
| 2. | | Disconnect the following hardware:<br>• UIP-P4 from CS Assy (J4) P/N 683-27524-4 | |
| 3. | Disconnect the following hardware:<br>• CS Assy (P4) P/N 683-27524-4 from ISPR Panel (J4 BUS B) | | |
| 4. | | Inspect the following hardware for damage:<br>• UIP-P4 Cable<br>• CS Assy P/N 683-27524-4 | |
| 5. | Connect the following hardware:<br>• Dust cap to ISPR panel (J4) | | |
| 6. | | Connect the following hardware:<br>• UIP-P4 Cable to HRF Rack (Dust cap J4) | |

T: _____ QA: ____

## 6.4.9    <u>LAN Interfaces</u>

## 6.4.9.1    LAN 1 Interface

## TABLE 6.44  LAN 1 INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|---|---|---|---|
| 1. | Verify the following:<br>• POWER (J1) LED        - off<br>• POWER (J2) LED        - off | | |
| 2. | | Disconnect the following hardware:<br>• UIP-P46 from CS Assy (J46) P/N 683-27524-8 | |
| 3. | Disconnect the following hardware:<br>• CS Assy (P46) P/N 683-27524-8 from ISPR Panel (J46 LAN 1) | | |

# TABLE 6.44  LAN 1 INTERFACE (CONT'D)

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 4. |  | Inspect the following hardware for damage:<br>• UIP-P46 Cable<br>• CS Assy P/N 683-27524-8 |  |
| 5. | Connect the following hardware:<br>• Dust cap to ISPR panel (J46) |  |  |
| 6. |  | Connect the following hardware:<br>• UIP-P46 Cable to HRF Rack (Dust cap J46) |  |

T: _____ QA: _____

## 6.4.9.2     LAN 2 Interface

# TABLE 6.45  LAN 2 INTERFACE

| Step | PRCU | HRF Rack 1 | HRF Rack 2 |
|------|------|------------|------------|
| 1. | Verify the following:<br>• POWER (J1) LED is off<br>• POWER (J2) LED is off |  |  |
| 2. |  | Disconnect the following hardware:<br>• UIP-P47 from CS Assy (J47) P/N 683-27524-9 |  |
| 3. | Disconnect the following hardware:<br>• CS Assy (P47) P/N 683-27524-9 from ISPR Panel (J47 LAN 2) |  |  |
| 4. |  | Inspect the following hardware for damage:<br>• UIP-P47 Cable<br>• CS Assy P/N 683-27524-9 |  |
| 5. | Connect the following hardware:<br>• Dust cap to ISPR panel (J47) |  |  |
| 6. |  | Connect the following hardware:<br>• UIP-P47 Cable to HRF Rack (Dust cap J47) |  |

T: _____ QA: _____

APPENDIX A

JSC Forms
These forms are for reference only.

| 1. PROJECT CODE | 2. JPIC CODE | | **TASK PERFORMANCE SHEET** NASA - LYNDON B. JOHNSON SPACE CENTER | | | | |

| 3. | A | CONFIGURATION CHANGE | | 4. TPS NO. | | | 5. PAGE OF |
|---|---|---|---|---|---|---|---|
| T Y P E | PERMANENT | | TEMPORARY | 6. MOD SHEET(S) NUMBER(S) | 7. ORG. | 8. SYSTEM | 9. NEED DATE |
| | B | NONCONFIGURATION CHANGE | | | | | |

| 10. PART NAME | 11. PART NO./DRAWING NO. | 12. SERIAL/LOT | 13. TIME/CYCLE/SHELF LIFE ☐ YES ☐ NO |
|---|---|---|---|

| 14. APPLICABLE DOCUMENTS | 15. CONTRACT NO./JOB NO. | 16. HAZ. TASK ☐ YES ☐ NO | 17. ENG. EVAL. ☐ YES ☐ NO |
|---|---|---|---|

| 18. SHORT TITLE OF TPS | 19. ADP UPDATE ☐ YES ☐ NO |
|---|---|

| 20. OPER SEQ. NO. | 21. OPERATIONS (Print, Type, or Write Legibly) | VERIFICATION | |
|---|---|---|---|
| | | 22. TECH. | 23. QA/DV |
| | | | |

| 24. ORIGINATOR | DATE | 25. FINAL ACCEPTANCE STAMP AND DATE |
|---|---|---|

APPROVALS (Printed or Typed and Signed)

| 26. PROJECT ENGINEER | DATE | 27. QUALITY ENGINEER | DATE |
|---|---|---|---|
| 28. | | 29. | |
| 30. | | 31. | |

JSC Form 1225 (Rev February 7, 2000) (MS Word August 1996)

Figure A-1  Task Performance Sheet

| 5. Page | of |
|---|---|

| **TASK PERFORMANCE SHEET** | 4. TPS NO. | |
| CONTINUATION PAGE<br>NASA - LYNDON B. JOHNSON SPACE CENTER | 6. MOD NO. | |

| 20. OPER<br>SEQ. NO. | 21. OPERATIONS<br>*(Print, Type, or Write Legibly)* | VERIFICATION | |
| | | 22. TECH. | 23. QA/DV |
| | | | |

JSC Form 1225A (Rev February 7, 2000) (MS Word August 1996)

Figure A-2  Task Performance Continuation Sheet

| 1. JPIC | Discrepancy Report/Material Review Record<br>NASA - Lyndon B. Johnson Space Center | 2.<br>Page 1 of ____ |
|---|---|---|

| 3. Ref. Doc # | 4. JDR # | 5. DR # |
|---|---|---|

| 6. Name of Top Assy. | 7. Drawing or P/N | 8. S/N or Lot # | 9. Qty. |
|---|---|---|---|

| 10. Name of Sub Assy | 11. Drawing or P/N | 12. S/N or Lot # | 13. Qty. |
|---|---|---|---|

| 14. Name of Component | 15. Drawing or P/N | 16. S/N or Lot # | 17. Qty. |
|---|---|---|---|

18. Description of nonconformance

| 19. Initiator's name (print and sign) | 20. Title/Stamp No. | 21. Org. | 22. Location | 23. Date |
|---|---|---|---|---|

| 24. Responsible Engineer/Mail Code | 25. CHRP Code | 26. CAGE Code | 27. Time/cycles used |
|---|---|---|---|

| xx. Category | 29. PRACA Reportable | 30. Configuration Change? | 31. Waiver? | 32. Corrective Action |
|---|---|---|---|---|
| ☐ Critical | ☐ Yes ☐ No | ☐ Yes ☐ No | ☐ Yes ☐ No | ☐ Yes ☐ No |
| ☐ Major | | | | |
| ☐ Minor | FIAR # _____ | DCN # _____ | Waiver # _____ | CAS # _____ |

| 33. Final Disposition | 34. MRB Req'd? | 35. Final Acceptance Stamp and |
|---|---|---|
| ☐ Rework ☐ Repair ☐ Change Classification ☐ Scrap | ☐ Yes | |
| ☐ Use-as-is ☐ Return to vendor/supplier ☐ Written in error | ☐ No | |

**Material Review Board**
(approvals must be typed or printed and signed)

| 36. Stress Engineer | Date | 37. Materials Engineer | Date |
|---|---|---|---|

| 38. Project Engineer | Date | 39. Quality Engineer | Date |
|---|---|---|---|

| 40. Other (print or type title) | Date | 41. QA Rep. (NASA) | Date |
|---|---|---|---|

| T1 Resp. Org. | T2 HW Type | T3 Prev. Cond. | T4 Fail. Mode | T5 Defect | T6 Remedial Act. | T7 Cause | T8 Recur. Ctrl. | T9 Perf. Org. | T10 Proc. Flow |
|---|---|---|---|---|---|---|---|---|---|

JSC Form 2176 (Rev August 10, 1999) (MS Word Sep 97)

Figure A-3  Discrepancy Report/Material Review Record

| 1. IDR # | **Discrepancy Report/Material Review Record** | 3. |
|---|---|---|
| | NASA - Lyndon B. Johnson Space Center | Page ____ of ____ |
| 2. DR # | | |

**Continuation Sheet**

| 4.<br>Insp. Pts. | 5.<br>Seq. No. | 6. Instructions<br>*(Print, type, or write legibly)* | 7. Verification<br>Stamps | |
|---|---|---|---|---|
| | | | Tech. | Qual. |
| | | | | |
| | | 8. Final Acceptance Stamp and Date | | |

JSC Form 2176A (Sep 97) (MS Word Sep 97)

Figure A-4  Discrepancy Report/Material Review Record Continuation Sheet

# Discrepancy Report/Material Review Record
NASA - Lyndon B. Johnson Space Center

**Summary Sheet**

| 3. Configuration Change? | 4. CCBD # | 5. PRACA # |
|---|---|---|
| ☐ No  ☐ Yes    DCN # | | |

6. Remedial Action

7. Root Cause

8. Corrective Action (Recurrence Control)

**MRB APPROVAL**

| 9. Stress Engineer (Print and sign) | Date | 10. Materials Engineer (Print and sign) | Date |
|---|---|---|---|
| 11. Project Engineer (Print and sign) | Date | 12. Quality Engineer (Print and sign) | Date |
| 13. Other (Print and sign) | Date | 14. QA Rep. (NASA) (Print and sign) | Date |

JSC Form 2176B (Oct 97) (MS Word Sep 97)

Figure A-5  Discrepancy Report/Material Review Record Summary Sheet

| 1. DR # | | | **Discrepancy Report/Material Review Record** NASA - Lyndon B. Johnson Space Center | | | | 2. Page ____ of ____ | | | |
|---|---|---|---|---|---|---|---|---|---|---|

**Multiple Disposition Coding Sheet**

A.

| T1 Resp. Org. | T2 HW Type | T3 Prev. Cond. | T4 Fail. Mode | T5 Defect | T6 Remedial Act. | T7 Cause | T8 Recur. Ctrl. | T9 Perf. Org. | T10 Proc. Flow |
|---|---|---|---|---|---|---|---|---|---|

B.

| T1 Resp. Org. | T2 HW Type | T3 Prev. Cond. | T4 Fail. Mode | T5 Defect | T6 Remedial Act. | T7 Cause | T8 Recur. Ctrl. | T9 Perf. Org. | T10 Proc. Flow |
|---|---|---|---|---|---|---|---|---|---|

C.

| T1 Resp. Org. | T2 HW Type | T3 Prev. Cond. | T4 Fail. Mode | T5 Defect | T6 Remedial Act. | T7 Cause | T8 Recur. Ctrl. | T9 Perf. Org. | T10 Proc. Flow |
|---|---|---|---|---|---|---|---|---|---|

D.

| T1 Resp. Org. | T2 HW Type | T3 Prev. Cond. | T4 Fail. Mode | T5 Defect | T6 Remedial Act. | T7 Cause | T8 Recur. Ctrl. | T9 Perf. Org. | T10 Proc. Flow |
|---|---|---|---|---|---|---|---|---|---|

E.

| T1 Resp. Org. | T2 HW Type | T3 Prev. Cond. | T4 Fail. Mode | T5 Defect | T6 Remedial Act. | T7 Cause | T8 Recur. Ctrl. | T9 Perf. Org. | T10 Proc. Flow |
|---|---|---|---|---|---|---|---|---|---|

F.

| T1 Resp. Org. | T2 HW Type | T3 Prev. Cond. | T4 Fail. Mode | T5 Defect | T6 Remedial Act. | T7 Cause | T8 Recur. Ctrl. | T9 Perf. Org. | T10 Proc. Flow |
|---|---|---|---|---|---|---|---|---|---|

3. Quality Engineer (Print and Sign)          Date

JSC Form 2176C (Oct 97) (MS Word Oct 97)

Figure A-6  Discrepancy Report/Material Review Record Multiple
Disposition Coding Sheet

**LOCKHEED MARTIN**

# FLASH REPORT

| NASA mishap no. |
|---|
| OSHA file no. |

| GENERAL INFORMATION | |
|---|---|
| 1. Date (MM/DD/YY) | 2. Time<br><br>☐ a.m. or ☐ p.m. |
| 3. Building number/location | 4. Specific area |

5. Category of incident (check appropriate box)

| | |
|---|---|
| ☐ Injury/accident | ☐ Fire |
| ☐ Auto accident | ☐ Explosion |
| ☐ Chemical spill | ☐ Other |

6. Description of incident (explain what happened, including cause or description of failure)




7. SEAT involvement (name of organization)

| PERSONNEL INVOLVED | |
|---|---|
| 8. Name (last, first, middle initial) | 9. Telephone |

| CONTACT PERSON | |
|---|---|
| 10. Name (last, first, middle initial) | 11. Telephone |

FORM SEAT 094 (09/23/97)

Figure A-7  Flash Report

## DISPOSAL INVENTORY
## FOR MISCELLANEOUS HAZARDOUS WASTES

**GENERAL NOTES:**

1. Waste sources must be identified.

2. Exceptions:
   See JSCI 8837 (current issue) for disposal
   methods for batteries, ether, explosives,
   empty drums, paint and chemical containers, radio-
   active and biological wastes, and precious metals.

3. Containers must be waterproof.

4. Containers must be labeled; all unlabeled
   containers will be returned to generators for
   proper identification.

5. For pickup, call x32038

**TO BE COMPLETED BY WASTE GENERATOR.**

| | |
|---|---|
| DATE | |
| BUILDING NO. | |
| ROOM NO. | |
| NAME | |
| PHONE EXTENSION | |
| MAIL CODE | |
| CARTON NO. _____ OF _____ | |

*Provide the following information at time of pickup:*
**PICK-UP TICKET NO.:**

## INVENTORY
*(Use a separate form for each carton of waste.*
*A copy of Inventory must be in or on each carton.)*

| IDENTIFICATION AND SOURCE OF WASTE | AMOUNT | IDENTIFICATION AND SOURCE OF WASTE | AMOUNT |
|---|---|---|---|
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JSC Form 1161 (Rev Aug 97) (MS Word Aug 97)    COPY 1 - SHIPPING    COPY 2    COPY 3 - ORIGINATOR

Figure A-8  Disposal Inventory for Miscellaneous Hazardous Wastes

| Repetitive Operations Log | | | | | | |
|---|---|---|---|---|---|---|
| Control Document: LS-71139-3 Rev ___ | | | | | Page ____ of ____ | |
| Section Number | Step Number(s) | Test Conductor | Date | Tech | QA | Reason/Remarks |
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Figure A-9  Repetitive Operations Log

| PASS 1000 _____ V dc | MAIN | AUX |
|---|---|---|
| **SSPCM Status - The SSPCM status bits/words show valid states.** | | |
| SSPCM BIT Status, (word 14) | Expected = x000, Diff = _____ | Expected = x000, Diff = _____ |
| SSPCM BIT Status, (word 15) | Expected = 0000, Diff = _____ | Expected = 0000, Diff = _____ |
| | TC: ____ Date: ____ | TC: ____ Date: ____ |
| **RIC Mode Status - The RIC is in Standby mode.** | | |
| MMC BIT and Status (word 260) | Expected = xxx1, Diff = _____ | Expected = xxx1, Diff = _____ |
| | TC: ____ Date: ____ | TC: ____ Date: ____ |
| **RIC Card BIT Status - All RIC card status bits are valid.** | | |
| S1553C Bit and Status, (word 249) | Expected = 4000, Diff = _____ | Expected = 4000, Diff = _____ |
| HRLC Bit and Status, (word 253) | Expected = 0100, Diff = _____ | Expected = 0100, Diff = _____ |
| MCC Bit and Status, (word 258) | Expected = 0000, Diff = _____ | Expected = 0000, Diff = _____ |
| SERC BIT and Status, (word 261) | Expected = 0000, Diff = _____ | Expected = 0000, Diff = _____ |
| | TC: ____ Date: ____ | TC: ____ Date: ____ |
| **RIC Cards Heart Beat Status - The RIC card heart beat word values vary between each STEP update.** | | |
| MCC BIT and Status, (word 259) | Expected = Value Varies, Diff = _____ | Expected = Value Varies, Diff = _____ |
| | TC: ____ Date: ____ | TC: ____ Date: ____ |
| **PEHB Status - The PEHB status bits/words show valid states.** | | |
| PEHB POST Results, (word 148) | Expected = 0000, Diff = _____ | Expected = 0000, Diff = _____ |
| PEHB BIT Results, (word 149) | Expected = 0000, Diff = _____ | Expected = 0000, Diff = _____ |
| LAN 0 BIT and Status, (word 158) | Expected = 0010, Diff = _____ | Expected = 0010, Diff = _____ |
| LAN 0 BIT and Status, (word 159) | Expected = FFFF, Diff = _____ | Expected = FFFF, Diff = _____ |
| LAN 0 BIT and Status, (word 160) | Expected = 0003, Diff = _____ | Expected = 0003, Diff = _____ |
| LAN 1 BIT and Status, (word 213) | Expected = 0010, Diff = _____ | Expected = 0010, Diff = _____ |
| LAN 1 BIT and Status, (word 214) | Expected = 0003, Diff = _____ | Expected = 0003, Diff = _____ |
| LAN 2 BIT and Status, (word 231) | Expected = 0010, Diff = _____ | Expected = 0010, Diff = _____ |
| LAN 2 BIT and Status, (word 232) | Expected = 0003, Diff = _____ | Expected = 0003, Diff = _____ |
| | TC: ____ Date: ____ | TC: ____ Date: ____ |
| **HRF Rack Equipment Channel Configurations - Verify, on the STEP "Health & Status Data Display" screen, that the rack channels are configured.** | | |
| Channel 1(DDC)/Channel 0(DC to DC Converter(DDC)) (word 133, MSB/LSB) | Expected = 3C3C, Diff = _____ | Expected = 3C3C, Diff = _____ |
| Channel 3(Spare)/Channel 2(RIC) (word 134, MSB/LSB) | Expected = 183C, Diff = _____ | Expected = 183C, Diff = _____ |
| Channel 5(Spare)/Channel 4(PEHB) (word 135, MSB/LSB) | Expected = 183C, Diff = _____ | Expected = 183C, Diff = _____ |
| Channel 7(DDC)/Channel 6(FDS) (word 136, MSB/LSB) | Expected = 3C3C, Diff = _____ | Expected = 3C3C, Diff = _____ |
| Channel 9(EMU)/Channel 8(LAP) (word 137, MSB/LSB) | Expected = 3C3C, Diff = _____ | Expected = 3C3C, Diff = _____ |
| Channel 11(Valve)/Channel 10(Valve) (word 138, MSB/LSB) | Expected = 3C3C, Diff = _____ | Expected = 3C3C, Diff = _____ |
| Channel 13(HRF Fan)/Channel 12(Valve) (word 139, MSB/LSB) | Expected = 3C3C, Diff = _____ | Expected = 3C3C, Diff = _____ |
| | TC: ____ Date: ____ | TC: ____ Date: ____ |
| **Verify, on the STEP "Health & Status Data Display" screen, that the payload channels are configured.** | | |
| Channel 15(SIR Drawer Location 2)/Channel 14(SD1) (word 140, MSB/LSB) | Expected = 1818, Diff = _____ | Expected = 1818, Diff = _____ |
| Channel 17(SD4)/Channel 16(SD3) (word 141, MSB/LSB) | Expected = 1818, Diff = _____ | Expected = 1818, Diff = _____ |
| Channel 19(SD6)/Channel 18(SD5) (word 142, MSB/LSB) | Expected = 1818, Diff = _____ | Expected = 1818, Diff = _____ |
| Channel 21(SD8)/Channel 20(SD7) (word 143, MSB/LSB) | Expected = 1818, Diff = _____ | Expected = 1818, Diff = _____ |
| Channel 23(SD10)/Channel 22(SD9) (word 144, MSB/LSB) | Expected = 1818, Diff = _____ | Expected = 1818, Diff = _____ |
| Channel 25(SD12)/Channel 24(SD11) (word 145 MSB/LSB) | Expected = 1818, Diff = _____ | Expected = 1818, Diff = _____ |
| Channel 27(SD14)/Channel 26(SD13) word 146, MSB/LSB) | Expected = 1818, Diff = _____ | Expected = 1818, Diff = _____ |
| Channel 29(FP)/Channel 28(SD15) (word 147, MSB/LSB) | Expected = 1818, Diff = _____ | Expected = 1818, Diff = _____ |
| | TC: ____ Date: ____ | TC: ____ Date: ____ |

Figure A-10  Health and Status Data Sheet

| Deviation | | | | | |
|---|---|---|---|---|---|
| TPS Number: | | | | Document Number: | Project Manager: | Test Engineer: |

| Dev No | Section | Step | Type (P/T) | Change | Reason |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
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| Originator: | | | Phone: | Date: | Quality Engineer: |
|---|---|---|---|---|---|

Figure A-11  Deviation Sheet

| Deviation Continuation Page | | | | TPS Number: | Document Number: | Page ___ of ___ |
|---|---|---|---|---|---|---|
| Dev No | Section | Step | Type (P/T) | Change | | Reason |
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Figure A-12  Deviation Continuation Sheet

APPENDIX B

Illustrations
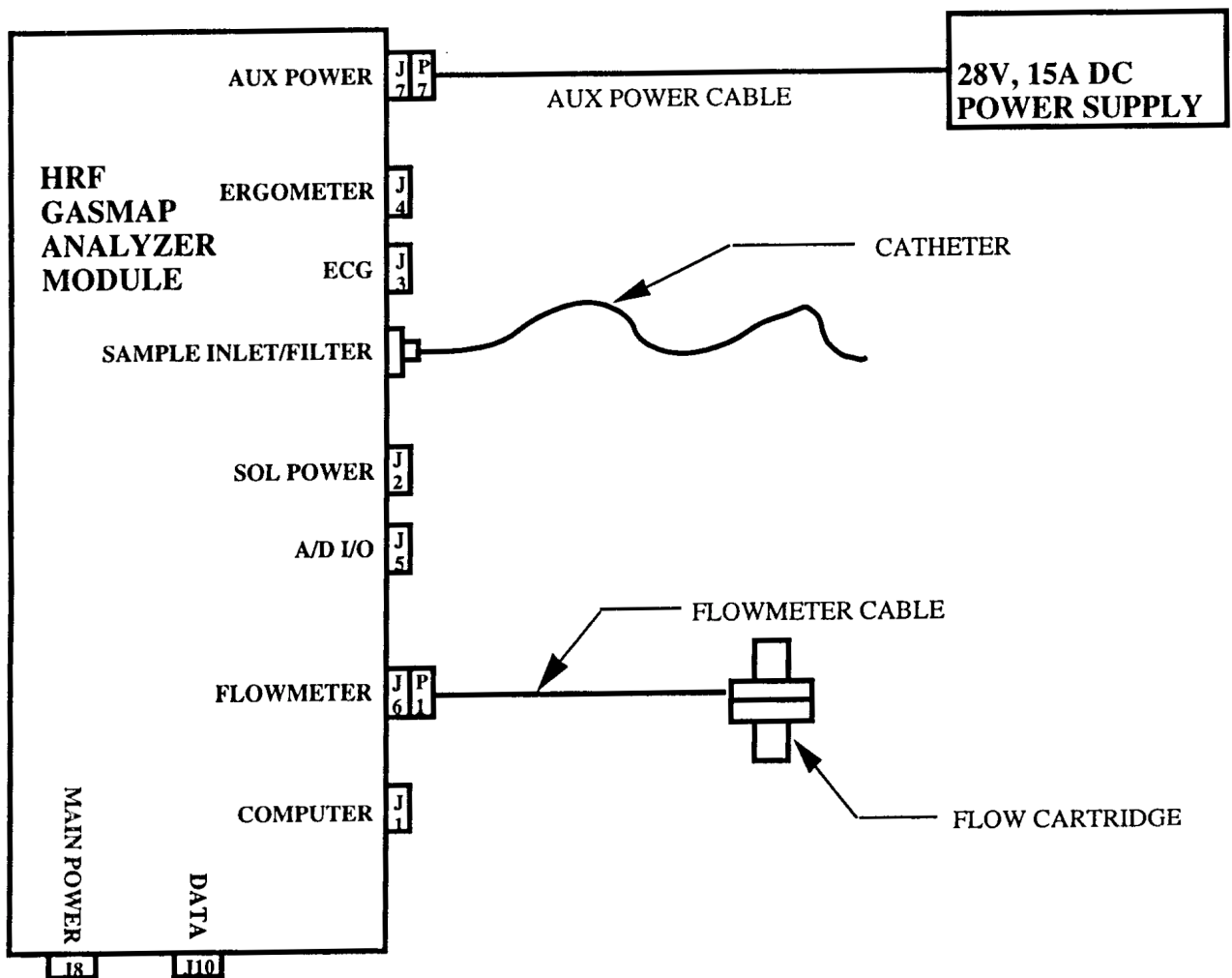
Figure B-1  GASMAP Assembly

Figure B-2  Ultrasound Assembly

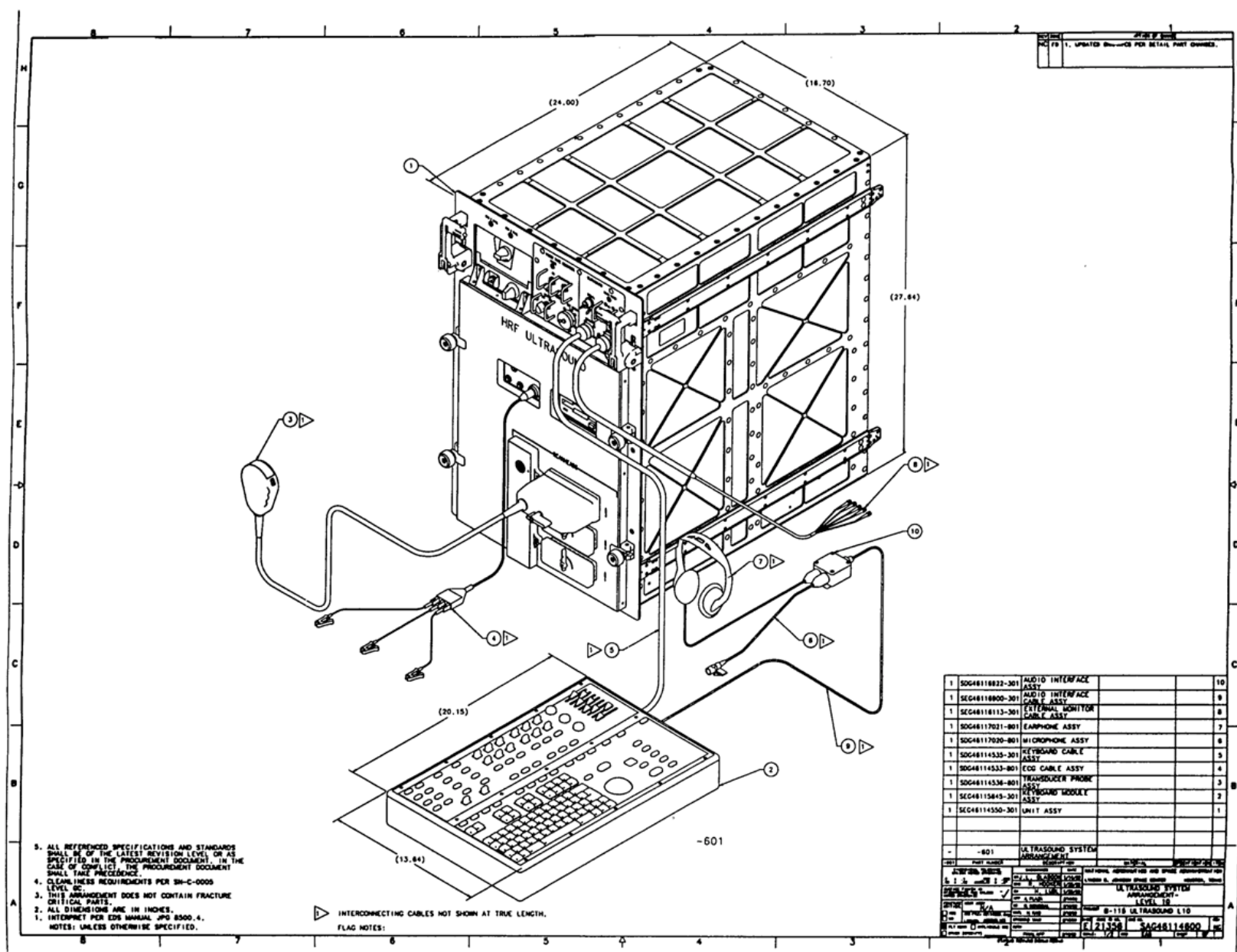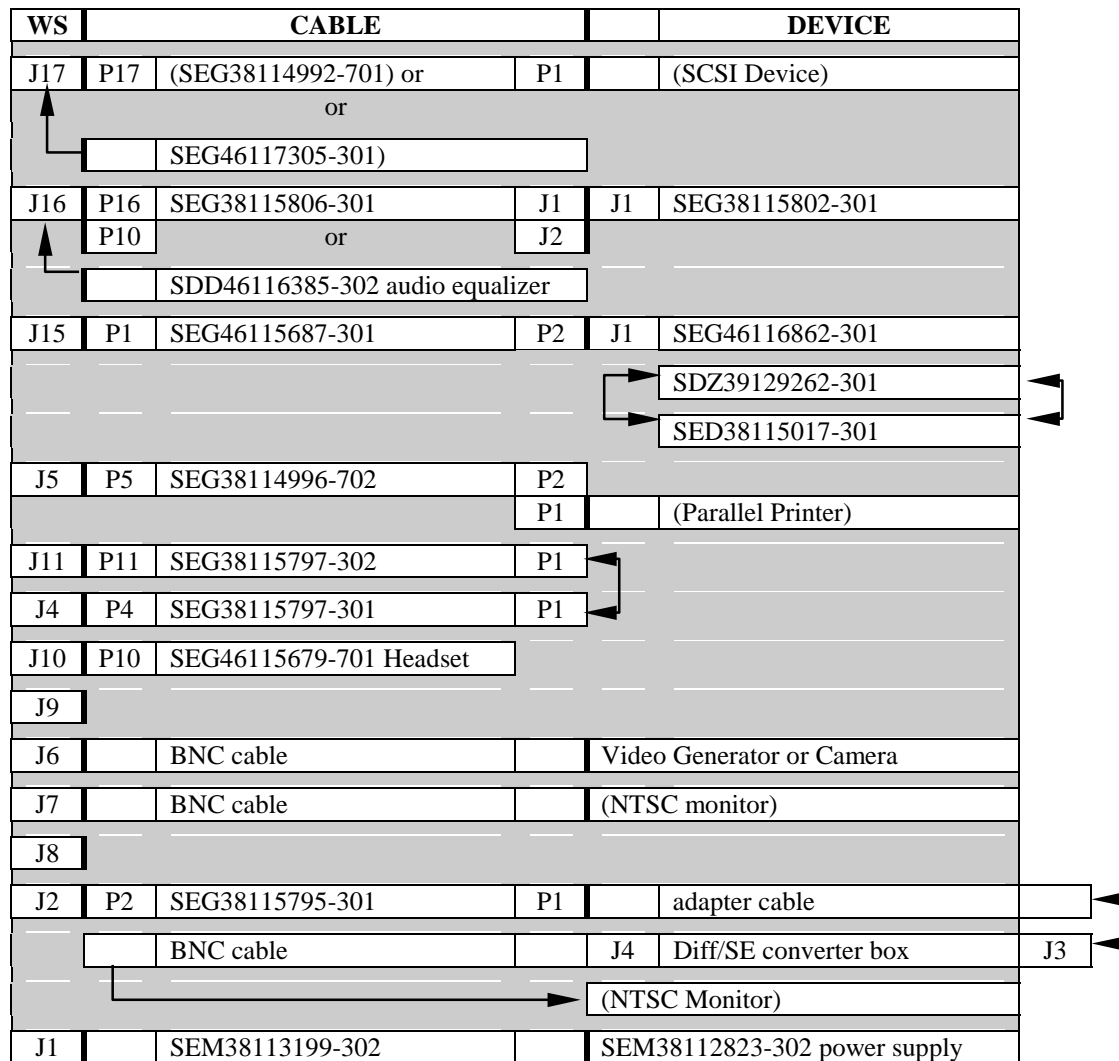| WS | | CABLE | | | DEVICE | |
|---|---|---|---|---|---|---|
| J17 | P17 | (SEG38114992-701) or | P1 | | (SCSI Device) | |
| | | or | | | | |
| | | SEG46117305-301) | | | | |
| J16 | P16 | SEG38115806-301 | J1 | J1 | SEG38115802-301 | |
| | P10 | or | J2 | | | |
| | | SDD46116385-302 audio equalizer | | | | |
| J15 | P1 | SEG46115687-301 | P2 | J1 | SEG46116862-301 | |
| | | | | | SDZ39129262-301 | |
| | | | | | SED38115017-301 | |
| J5 | P5 | SEG38114996-702 | P2 | | | |
| | | | P1 | | (Parallel Printer) | |
| J11 | P11 | SEG38115797-302 | P1 | | | |
| J4 | P4 | SEG38115797-301 | P1 | | | |
| J10 | P10 | SEG46115679-701 Headset | | | | |
| J9 | | | | | | |
| J6 | | BNC cable | | | Video Generator or Camera | |
| J7 | | BNC cable | | | (NTSC monitor) | |
| J8 | | | | | | |
| J2 | P2 | SEG38115795-301 | P1 | | adapter cable | |
| | | BNC cable | | J4 | Diff/SE converter box | J3 |
| | | | | | (NTSC Monitor) | |
| J1 | | SEM38113199-302 | | | SEM38112823-302 power supply | |

**NOTE:** Items in parentheses ( ) are optional. They may be used but are not always required or are not always connected.

Figure B-3  Connections for WS Testing

| WS | | CABLE | | | DEVICE |
|---|---|---|---|---|---|
| J14 | P14 | SEG38115015-301 | P1 | | (Monitor) |
| | | | P2 | | Keyboard |
| | | | P3 | | |
| J12 | P12 | SEG38115796-301 | P2 | | Mouse |
| | | | P3 | P1 | SEG38115003-701 |
| | | | P4 | P1 | SEG38115003-701 |
| | | | P5 | | |
| J3 | P3 | SEG38114993-303 | P1 | | (Monitor) |
| | | | P2 | | (Monitor) |
| | | | P4 | | |
| | | | P5 | | |

Figure B-4  Non-Flight Monitor and/or Keyboard Connections to WS

| WS | | CABLE | | | DEVICE | |
|---|---|---|---|---|---|---|
| 28V PWR | P1 | SEG46115683-301 | P2 | pwr | FP1610HB/R-06 Monitor | data |
| | | | P1 | | SEG46115492-301 Cable | P2 |
| | | | P3 | | | |
| J14 | P14 | SEG46115494-301 | P1 | | SEG46114997-301 Keyboard | |
| | | P2 | | | | |
| J12 | P1 | SEG46115686-302 | P2 | | | |
| | | | P3 | | P5 loopback | |
| | | | P4 | | P6 loopback | |
| J3 | P3 | SEG46115490-301 | J1 | | | |
| | | | J2 | | | |

**NOTE 1:**   Dotted lines indicate alternative connections.

**NOTE 2:**   Serial Breakout Cable SEG46115686-302 has as its cap a mating connector wired for loopback function.  The Ground Support Equipment (GSE) Loopback Assembly SEG38115003-701 is neither needed nor compatible with this cable.

Figure B-5  Flight Monitor and/or Keyboard Connections to WS

| WS | | CABLE | | DEVICE |
|---|---|---|---|---|
| J11 | P11 | SEG46115489-301 | P2 | |
| J4 | P4 | | P5 | |

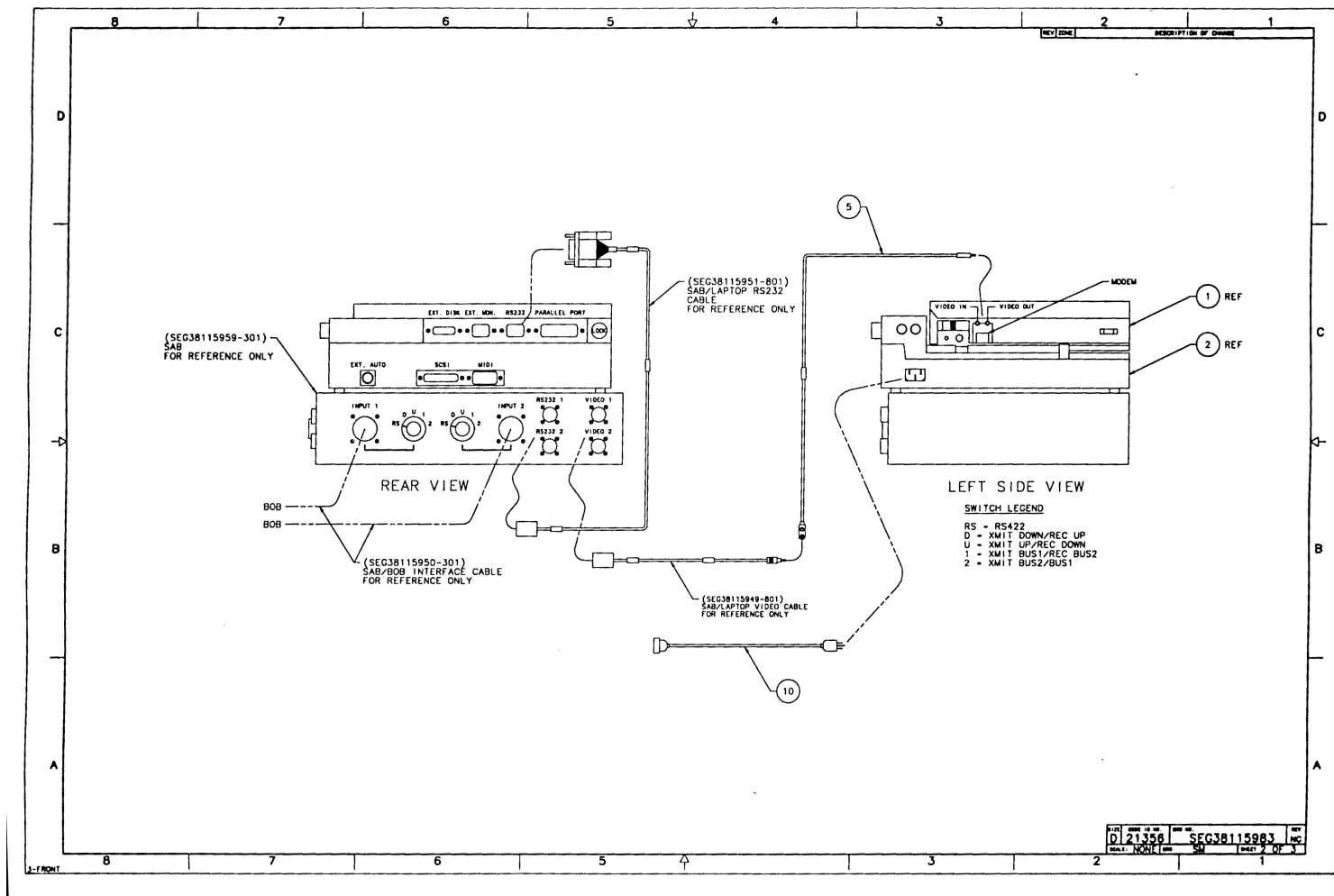Figure B-6  Connections for WS Testing Using Other Flight Items

Figure B-7 Test Support System Assembly Rear View and Left Side View
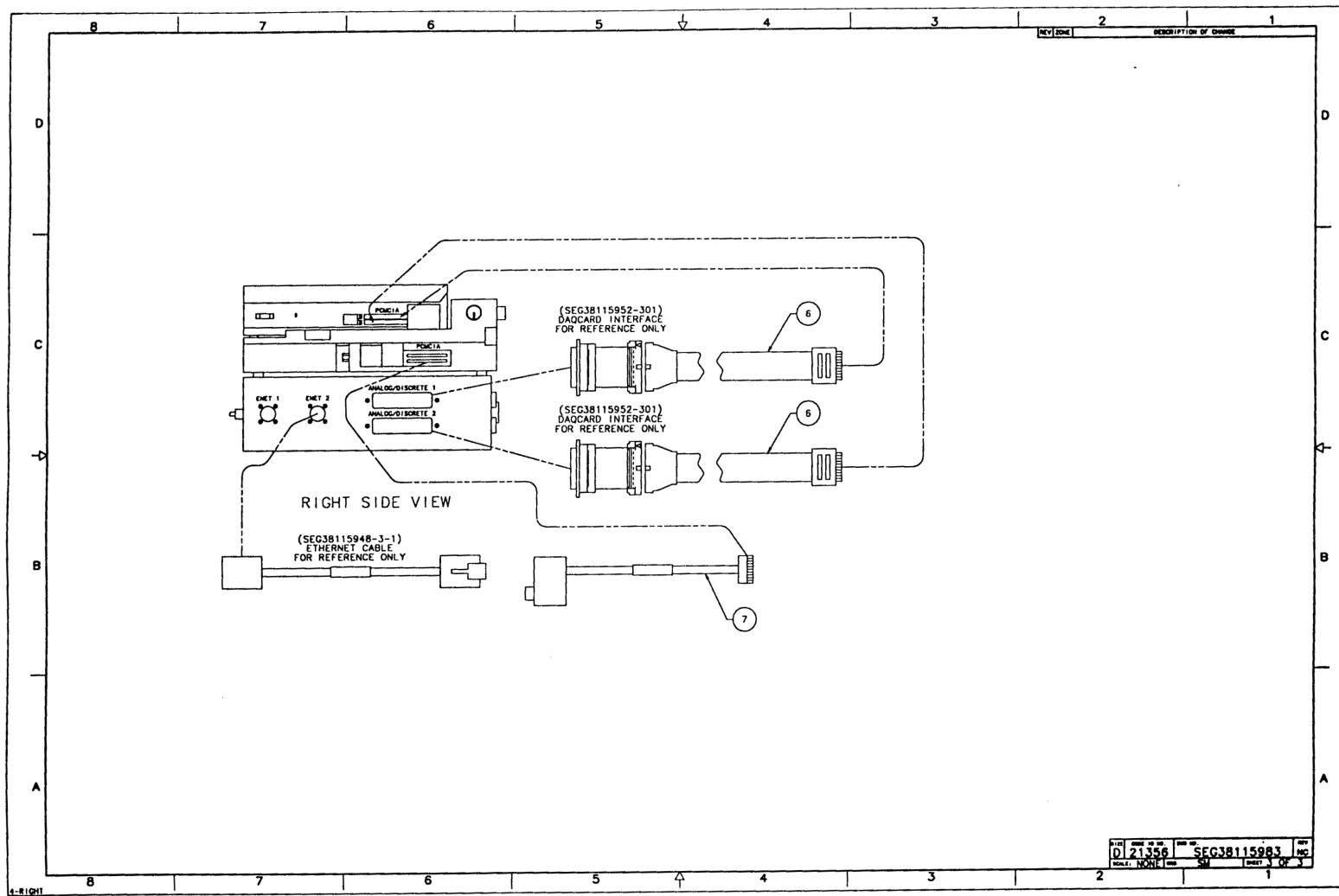
Figure B-8  Test Support System Assembly Right Side View

DISTRIBUTION
FOR LS-71139-3


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EA5/E. Strong
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